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STAFF LETTER

# HELP IS COMING FOR YOU KEYSTROKERS

Do you keystroke the templates published in this magazine? If so, we're about to save you a lot of time. Do you ever have trouble making one of those templates run? If so, we're about to save you some frustration as well.

By and large, we've done pretty well in maintaining the accuracy of our templates and instructions—thanks to a vigilant staff of technical editors headed by Carrie Thomas. But there's one factor we can't control, and that's the errors *you* make when you enter data or formulas. Judging from your letters and phone calls, those errors have been increasing—probably because some of our recent templates have been quite large.

So, to save you both time and frustration, we have taken the first steps toward making our templates available in electronic form. By the time you read this, barring an unexpected hitch, the templates that have appeared in 1989 issues will be available from The World of Lotus on CompuServe. By year's end, templates from the 1987 and 1988 issues should be available as well.

If you know your way around CompuServe, you shouldn't have any trouble finding and downloading the *LOTUS* templates. In the next issue, however, we will provide more details for those of you who are new to, or have not yet joined, CompuServe.

Our CompuServe connection is a logical one because The World of Lotus is the top on-line meeting place for those who need help, or want to give help, on *1-2-3, Symphony*, and all other Lotus products. However, we don't plan to stop there. Once we have our CompuServe act together, we will start working out other ways to make our templates available to you in electronic form—disks, of course, and probably our own, simpler electronic bulletin board.

Some of you may want to wait for those other electronic services, and some of you may feel that you learn more by keystroking. If you are in this last group, here are a few tips that may help you avoid keystroking errors:

1. Don't type a space unless you see one. A formula doesn't contain a space unless it's between quotation marks (for example, " "). Don't insert a space when a formula continues to a second line.

2. Don't confuse 1 (the numeral) with l (the letter) or I (the letter). In a cell address, the letter would appear as a capital L. So there's no reason to confuse B14 with BL4. You'll have to be a bit more careful distinguishing I from 1, but the context should make clear which is which.

3. When you copy a macro from an illustration into your worksheet, enter an apostrophe at the beginning of every line of the macro that starts with a slash, a label-prefix character, a numeral, an arithmetic operator, a parenthesis, an @ sign, or a period.

4. Note that our typographical convention for macros is that commands are in uppercase letters and variables are in lowercase letters.

5. Double-check ranges. Use the Range Name Table command, print out the resulting table, and compare it with the instructions.

6. Be sure your spreadsheet release supports all the commands and @functions used in the template you're keystroking. (See "A Compatibility Guide" on page 72 for help with this.)

If you follow these tips, you'll eliminate most of the errors we hear about.

John B. Campbell
Editorial Director

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# LETTERS

## WHY WE ACCEPT MICROSOFT ADS

With regard to the Microsoft advertisement on pages 128 and 129 of your July issue, have you people lost your minds or is it one or more of the following:

1. This is your idea of a whimsical stirring of conversation.
2. You are so sure of the entrenched position of *1-2-3* that you don't believe anyone will switch to *Excel*, regardless of the incentive.
3. If Microsoft wants to throw away its advertising money, who are you to turn them down?

*P. P Braswell*  
*Rosewell Corporation*  
*Chesapeake, Va.*

Editor's note: *We have good reasons for running ads, such as Microsoft's, that extol the virtues of competitors of* 1-2-3. *First and foremost: Although we are committed editorially to* 1-2-3 *and* Symphony *users, we believe that a magazine should be a free marketplace for ideas. Second, Microsoft pays its bills, and we use the cash to help support this magazine. And yes, based on our own experience with* 1-2-3 *and our reluctance to abandon software that works, we do believe that few readers will switch to* Excel. *Microsoft, which has a fine product, presumably hopes otherwise.*

## SOME PAYABLES REVISIONS

Richard Cranford's "Your Payables Can Work For You" [July] contains a problem in the accounts payable report.

If an account is past due, the fact that you once could have taken advantage of a cash discount no longer applies. Therefore, when the macro executes the Data Query Extract command, *Pay* appears as one of the output headings. This is incorrect. The word that should appear to give the correct balance due is *Amount*.

*Joel Hershfield*  
*Department of Justice*  
*Winnepeg, Manitoba*

Author's note: *Good point. The same holds true for bills that are due today without discount. You need to make some changes to the* report *macro.*

*Edit cell S59 to read:*

```
/Coutput1~~{RIGHT 2}"Amount
  {LEFT 2}
```

*Edit cell S64 to read:*

```
/Coutput1~~{RIGHT 2}"Amount~
```

*Edit cell S65 to read:*

```
{RIGHT}"DueDate{LEFT 3}
```

I have one small problem with your worksheet for handling payables. When I select Update from the menu, then type 07/11/89 as *Start of credit period* and 07/14/89 as *Terms*, and answer that the entries are correct, the program enters *X X −10* as *Terms*. I assume that the −10 is supposed to be subtracted from @NOW, which is 07/24/89, to give an answer of 07/14/89. However, it is being subtracted from the *Start of credit period* date and is giving an answer of 07/01/89. Can you help me?

*Don Wilson*  
*Address unknown*

Author's note: *You've uncovered a conceptual error in the worksheet. There is a formula in a cell named* convert *that subtracts the current system date from the due date if you enter a date as* Terms. *It should subtract the date in* Start of credit period *from the due date.*

*To correct the problem, edit the formula in cell AB3 to read:*

```
@IF(@ISERR(parse3),"","X X "&
  @STRING(parse3-crdate,0))
```

## MULTIPLE WORKSHEETS, NOT ATTENDANCE

Your magazine has gotten me out of the woods on many occasions. But I believe your attendance-tracking program in "Design a Multiple-Worksheet Application" [June] is risky. By extracting and combining each day's percentages and then dividing the sum of those percentages by the number of days in your cumulative-attendance program, you're assuming that each school has been in session the same number of days.

*Rick Beeman*  
*Detroit Diesel Corp*  
*Detroit, Mich.*

Editor's note: *The purpose of the article you cite is to explain and demonstrate the concept of applications that involve more than one worksheet file. It is not to present the reader with a comprehensive attendance-tracking application. If you use the model to track attendance, you'll probably find other shortcomings.*

## HOUSE BUYING AND THE STANDARD DEDUCTION

In "To Buy or Not to Buy" [May], the authors suggest that the tax savings from the mortgage-interest deduction start with the first dollar. But this can overstate tax savings. Take the case of a married couple filing jointly: In 1988 they received a $5,000 standard deduction. So they really don't save any tax until and unless their mortgage-interest payments push their deductions over the standard-deduction amount.

*Kurt J. Stumbaugh, C.P.A.*  
*Franklin Park, N.J.*

## @ERR

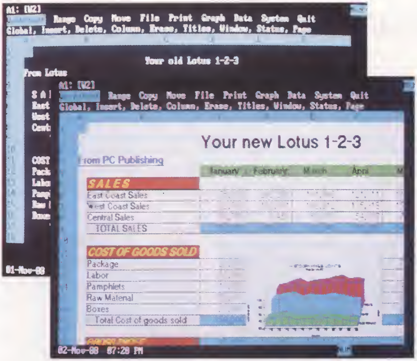
"Your Payables Can Work For You" [July]: See the letters on this page under the heading "Some Payables Revisions." Also, there is a missing comma in the formula given for cell AB1 on page 54 The correct formula is:

```
@MID(terms,@FIND(" ",
  terms,0)+1,@FIND(" ",
  terms,@FIND(" ",terms,0)
   +1)-@FIND(" ",terms,0)-1)
```

"We Checked Up On You Again" [Staff Letter, August]: We said that, based on a *LOTUS* survey, "10% of you expect to acquire OS/2 within a year." While technically accurate, that figure may not be a good predictor. Three-quarters of those surveyed chose not to answer the question about future purchases of operating systems. Of those who did answer, 38% indicated they planned to acquire OS/2 within a year.

"What Do You Do With 20 Million Used PCs?" [August, Ideas and Trends]: The price for the Orion Computer Blue Book is $99.50.

*Letters to the editor should be sent to Letters Editor,* LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123. Letters may be edited for length and clarity.*



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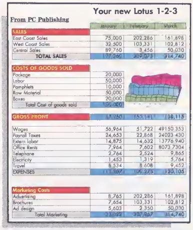

Your new Lotus 1-2-3

From PC Publishing

| | January | February | March |
|---|---|---|---|
| **SALES** | | | |
| East Coast Sales | 75,000 | 202,286 | 161,898 |
| West Coast Sales | 32 500 | 103,331 | 102,812 |
| Central Sales | 89 760 | 3 456 | 50 030 |
| TOTAL SALES | [illegible] | 309,073 | 314,740 |
| **COSTS OF GOODS SOLD** | | | |
| Package | 20,000 | | |
| Labor | 50,000 | | |
| Pamphlets | 10,000 | | |
| Raw Material | 50,000 | | |
| Boxes | 20 000 | | |
| Total Cost of goods sold | [illegible] | | |
| **GROSS PROFIT** | [illegible] | 153,141 | 138,115 |
| Wages | 56,964 | 51,722 | 49150 353 |
| Payroll Taxes | 24,653 | 22,868 | 24023 430 |
| Extern labor | 14,875 | 14,632 | 13776 940 |
| Office Rents | 7,964 | 7,602 | 8073 7304 |
| Telephone | 2,764 | 2,524 | 9,865 |
| Electricity | 1,453 | 1,319 | 5,764 |
| Travel | 8 534 | 8 608 | 9,452 |
| EXPENSES | [illegible] | 109,275 | 120,105 |
| **Marketing Costs** | | | |
| Advertising | 8,765 | 202,286 | 161,898 |
| Brochures | 7,654 | 103,331 | 102,812 |
| Ad design | 5,603 | 2 350 | 50 030 |
| Total Marketing | [illegible] | 307,967 | 314,740 |

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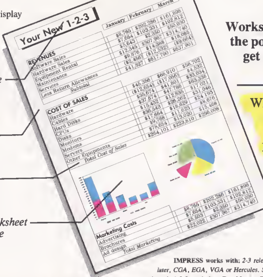

Your New 1-2-3

| | January | February | March |
|---|---|---|---|
| **REVENUES** | | | |
| Software Sales | $8,765 | $202,286 | $161,898 |
| Hardware Sales | $7,654 | $103,331 | $102,812 |
| Equipment Rental | $5,643 | $2,350 | $50,030 |
| Maintenance | $12,345 | $307,967 | $314,740 |
| Services | $9,876 | $14,388 | $18,085 |
| Less Return Allowances | ($2,456) | ($12,532) | ($9,664) |
| *Subtotal* | $41,827 | $617,790 | $637,901 |
| **COST OF SALES** | | | |
| Hardware | $45,356 | $68,910 | $58,702 |
| Cables | ($12,654) | ($17,056) | $4,532 |
| Hard Disks | $35,674 | $41,801 | $33,034 |
| CPUs | $37,674 | $47,786 | $63,336 |
| Disks | $15,432 | $12,835 | $17,021 |
| Monitors | $36,543 | $26,262 | $31,046 |
| Modems | $17,654 | $18,629 | $24,193 |
| Servers | $9,768 | $11,623 | $8,676 |
| Other Equipments | $78,654 | $13,020 | $15,468 |
| *Total Cost of Sales* | $264,101 | $223,810 | $256,008 |
| **Marketing Costs** | | | |
| Advertising | $8,765 | $202,286 | $161,898 |
| Brochures | $7,654 | $103,331 | $102,812 |
| Ad design | $5,503 | $2,350 | $50,030 |
| *Total Marketing* | $22,022 | $307,967 | $314,740 |

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| Synchronized live graphs | No | Yes |
| See more rows & columns on screen | No | Yes |
| Automatic print compression to fit page | No | Yes |

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CIRCLE 108 ON READER SERVICE CARD

# A '286 OR A '386: MEMORY MAKES THE DIFFERENCE

*For long-term compatibility, a '386 PC is a better buy.*

So you have an 8088 machine, and you want to upgrade. Should you buy a less expensive 80286-based system or spring for a pricier 80386? If speed, compatibility, and technological longevity are important to you, experts say you should consider the more powerful machine.

The '286, introduced in 1984 in the IBM PC AT, was certainly a vast improvement over the 8088. Its clock speed was two to three times faster, it sported a data bus twice as wide, and it could address 16 megabytes of memory—16 times more than the 8088.

Unfortunately, DOS and DOS programs weren't designed to use that extra memory. Running programs in memory above 640K required an advanced operating system such as OS/2, which didn't exist at the time, or special expanded-memory hardware. And both solutions required software that was written to take advantage of them.

The result was that many people who bought a '286 in search of a memory breakthrough were bitterly disappointed. Consumer advocate Harvey Rosenfield, author of Proposition 103, California's landmark auto-insurance bill, bought one of the first PC ATs. "I paid extra," he says, "for a machine that was nothing but a fast PC."

With Intel Corp.'s 80386 processor, introduced in 1985, computers gained even more speed. The '386 offers higher clock rates than the '286 and a data bus twice again as wide. But some people believe that the '386 is nothing more than an even faster PC. Sure, they say, the CPU can address up to 4 gigabytes (4,000 megabytes) of memory, but few programs actually need that much memory. And even OS/2 can't address more than 16 megabytes.

**Maximum memory control**

Today, agrees analyst Andrew Seybold, publisher of the newsletter *Andrew Seybold's Computer Insider Incorporated*, speed is still the main benefit of a '386. "But," he says, "if you want to be on a network or run multiple applications, you definitely want a '386."

The reason is that the '386 can control and use all three types of memory—conventional, expanded, and extended—more efficiently than the '286 can. The result is smoother multitasking as well as greater speed.

Here's how the three types of memory stack up:

- Conventional memory is RAM between 0K and 1,024K, or 1 megabyte. DOS and DOS applications are designed to run in the first 640K of this memory, also known as "real" memory, or real mode. DOS reserves the remaining 384K for the BIOS (basic input/output system) and video-control routines.
- Expanded memory is memory above 1 megabyte that conforms to a particular specification, most commonly the Lotus/Intel/Microsoft Expanded Memory Specification. Under LIM-EMS 4.0, you can add up to 32 megabytes of expanded memory. A technique called bank switching transfers data or program code as needed between the expanded memory space and the EMS page frame, a 64K address space in conventional memory.
- Extended memory is also RAM above 1 megabyte, but it's available only on '286 and '386 machines. DOS can use

GREG COUCH

extended memory only for such peripheral activities as setting up a print queue. In order to use extended memory, a DOS application must be written to operate in the '286's or '386's "protected" mode—so called because it protects programs running concurrently from colliding or overwriting one another.

Three types of programs can run in protected mode: terminate-and-stay-resident programs that have been specially designed to do so, multitasking environments such as *Microsoft Windows*, and programs, such as *1-2-3* Release 3, that incorporate DOS-extender technology. A DOS extender is a small-scale system kernel that switches between real and protected modes and provides an interface between the application and DOS and BIOS services.

'IF YOU WANT TO RUN MULTIPLE APPLICATIONS, YOU DEFINITELY WANT A '386.'

**The mode-switch minuet**

A DOS program running in protected mode must switch to real mode in order to perform such tasks as reading the disk or keyboard. Even if it's not performing a specific task, DOS switches modes more than 1,000 times a minute just to keep its time and date clock updated.

On a '286, every time a program switches from protected to real mode, the software has to run a routine to "reset" the CPU. The routine takes less than a millisecond, so it doesn't bring the machine to a halt. But it does affect performance. The '386, however, lets a program switch modes without resetting the CPU. That's one reason a '386 is significantly faster than a '286 running at the same clock speed.

The '386 also has a memory-management capability known as virtual addressing or demand paging. It allows the CPU to remap memory to anywhere in the entire address space. This means that it can move program code and data easily between conventional memory and any other memory it finds. Moreover, it can remap memory in "pages" as small as 4K. Under the '286's less efficient memory-management scheme, memory is defined in 64K segments. This means, for example, that a '286 has to appropriate a 64K memory space to move 8K of data.

Another advantage of the '386 is that it provides a more stable environment for multitasking. That's because the hardware controls the process of switching among tasks and programs. This virtually eliminates the possibility that one program will cause another to crash. On a '286, however, software developers must program the switching routine into each application, which increases the possibility of conflicts and incompatibilities among programs.

For example, says Gary Saxer, technical services director of Quarterdeck Office Systems (Santa Monica, Calif.), *Desqview* on a '286 has to juggle program code and data. To do this, it must be aware of all the other programs or they must be aware of *Desqview*. But the '386 automatically reassigns memory among conventional, expanded, and extended memory locations, and programs can be what Saxer calls "*Desqview*-oblivious."

For maximum efficiency on a '286, Saxer says, you must first disable all the memory below 640K on the system board so that the CPU uses only expanded memory. This not only wastes memory, but also involves disemboweling your computer and flipping tiny switches on the motherboard.

**Spend a little more**

A few machines, such as the AST/Premium 286, spare you from the task of disabling system-board memory. Such machines, however, tend to cost more than the average '286. Considering the expense of buying a high-end '286 machine or equipping your '286 clone with an expanded-memory board, says Saxer, "you're better off spending a little extra for a '386."

Aside from the extra speed and the smoother multitasking it offers, you may want a '386 for long-term compatibility. Bruce Lupatkin, senior technology analyst for the San Francisco venture-capital firm of Hambrecht&Quist, thinks the '386 will replace the '286 as a mainstream business machine much faster than the '286 replaced the 8088/8086 family.

Indeed, the computer industry is redirecting its efforts from the '286 to the '386. Microsoft, for example, is reported to be working on a '386-only version of OS/2. It will be available at "about the time that OS/2 applications start to build to a critical mass," predicts Lupatkin. "The software community," he says, "is developing applications to take advantage of the '386." And many of them, like some existing DOS-extended programs, won't work on a '286.

While the '286 is not yet dead, Intel's marketing strategy is sharply focused on the '386 and on its new i486 CPU. And, says Intel's Bill Rash, the upcoming crop of i486 machines will bring '386 system prices down even further.

*—Laurence Magid*

## LAPTOP MAKERS STRESS SMALL AND LIGHT

### *A full-featured one-pounder and a mix-and-match workstation*

Portable computers are changing nearly as fast as the press can write about them. Since the 23.5-pound Osborne 1 first appeared on the market in mid-1981, many companies have introduced portable systems. And each company has claimed that its machine is smaller, lighter, and more powerful than last year's models.

**A pocketful of PCs**

Until now, the annual crop of new portables has shown incremental changes rather than technological leaps. But some recent portables are harbingers of a new generation of mobile computing. They aren't just smaller and lighter; they constitute a rethinking of the mobile-PC concept. One company has taken smallness to the limit of practicality. Another

**The one-pound Poqet can run 40 hours or more on a single battery charge.**

company lets you piece together the portable computer you want.

It's hard to imagine a useful IBM PC–compatible computer weighing approximately one pound, but that's all the load you carry with the Poqet (pronounced *pocket*), from Poqet Computer Corp. (Sunnyvale, Calif.). About the size of a videocassette, the Poqet can run most DOS applications in its full-size 512K memory, and its screen displays the desktop standard of 80 characters by 25 lines. And unlike its "calculator-style" competitors, such as the Sharp Wizard, the Poqet has a conventional keyboard layout.

One of the most intriguing technical aspects of the Poqet is its miserly use of battery power. Poqet's president, Stav Prodromou, says the Poqet's batteries will power the system "an order of magnitude" longer than current portables. This implies 40 to 60 hours of operation between battery charges—unprecedented battery endurance in a portable computer. Little is known about its power-supply technology. Poqet is guarding the engineering details until dozens of patent applications are processed.

Some analysts think a $2,000 price tag is high for a computer with no disk drives and not much more memory than the original IBM PC. Others, like Paul Saffo, a research fellow with the Institute for the Future, in Menlo Park, Calif., think not. "No well-dressed nerd will be caught without one," he predicts. "It will be the ultimate irony," he adds, "if it turns out that the way to get a computer on every executive's desk is to put one in his pocket."

### The Lego approach

Agilis Corp. (Mountain View, Calif.) takes an entirely different tack with its customizable hand-held "workstation." The Agilis approach to computer design lets you configure your own system by combining individual modules (the company calls them "slices"), much as children can design and build high-rises with Lego construction toys.

For example, one module contains either an 8088 or 80386 processor; another consists of an IBM Enhanced Graphics Adapter–compatible display with a touchscreen, a keyboard, or both. Internal-storage options include floppy-disk, hard-disk, or RAM/ROM card modules. You can also choose a battery or a power-conversion module, as well as a communications module for access to cellular or local-area radio networks. The components latch together and are linked with a built-in Ethernet connection. Depending on the configuration you choose, an Agilis system can cost from $2,000 to $20,000.

**Here's how the various building blocks in an Agilis workstation stack up.**

Agilis wanted a flexible design, says Chief Operating Officer Ken Biba, because "the applications we see for our systems are quite different from what have been the usual portable-computer applications." These include field-engineering and industrial-automation applications, control systems for military and civilian emergency services, and networked applications for mobile work groups. "Previously," says Biba, "people used portables to move applications from office to office. But we're dealing with people who don't have offices."

### Zenith and Toshiba

Meanwhile, Zenith Data Systems (Glenview, Ill.) and Toshiba America (Tustin, Calif.), which are generally ranked first and second, respectively, in portable-computer sales, continue to expand their portable-computer lines.

Zenith recently introduced a portable called the MinisPort, a 5.9-pound unit with an unusual 2-inch, 720K floppy-disk drive. However, a new floppy-disk format may not be great news for those who are just getting used to the problems of exchanging programs and files between 5¼- and 3½-inch disks.

In other respects, the MinisPort is similar to previous Zenith portables, except that it's smaller, lighter, and at $1,999, $400 less than its most-comparable predecessor. Industry sources believe that Zenith may offer the MinisPort to students—an important market for lightweight portables—for about $1,200.

Toshiba is less forthcoming about its portable plans. However, the company has shown a system in Japan that seems a likely candidate for importation. Dubbed the Dynabook, the 5.9-pound system has a 3½-inch floppy disk and offers 1.5 megabytes of memory. Bill Lempesis, a PC analyst for Dataquest, a market research firm in San Jose, Calif., believes the system will cost about $1,500 if Toshiba sells it here. Toshiba's official comment is that the system "may or may not be introduced in the United States."

### Dynabook lives

Whether or not it reaches these shores, Toshiba's Dynabook should not be confused with the Dynabook concept first

**THE NEWEST PORTABLES**

| System | Weight (lbs.) | Size (H″ × L″ × W″) | Processor | Memory | Disk Storage | Screen (ch × l) | Battery Life (hours) | Base Price |
|---|---|---|---|---|---|---|---|---|
| Poqet | 1.0 | 1 × 8.5 × 4 | Intel compatible | 512K | none | 80 × 25 | 40–60[1] | $1,995 |
| NEC UltraLite | 4.4 | 1.4 × 11.8 × 8.3 | NEC V-30 (9.83 MHz) | 1MB or 2MB | none | 80 × 25 | 1.5 | $2,999 or $3,699 |
| Zenith MinisPort | 5.9 | 1.3 × 12.5 × 9.8 | 80C88 (8 MHz) | 1MB | 2" 720K floppy | 80 × 25 (CGA) | 3 | $1,999 |
| Dynabook 286 | 7.6[2] | 1.7 × 13.6 × 11[2] | 80C286 (16 MHz) | 1MB | 20/40MB hard | 80 × 25 (VGA) | 2–4 | $5,195[3] |
| Agilis System | 4–8 | 2 × 8 × 7[4] | 80C88 (10 MHz) or 80386 (20 MHz) | 640K | 20MB hard | 80 × 25 (EGA) | 2–5 | $2,000–$20,000 |

[1] Estimated
[2] Not including battery
[3] With screen and 20MB disk
[4] Typical configuration

explored in 1968 by Alan Kay, now a research fellow at Apple Computer. Kay's Dynabook was envisioned as the ultimate writing and communicating tool—a very *personal* personal computer. Apple Computer recently expanded on the idea in the company's *Knowledge Navigator* series of videos, which dramatize technologies of the future.

The Dynabook concept has attracted so much industry and media attention that several companies—including Dynabook Technologies Corp., located in San Jose, Calif.—have used the name for a confusing array of products, from portable computers to a portable CD-ROM reader from Scenario Inc. (Boston). Not surprisingly, there's been some wrangling about who owns the name. In fact, as a result of a recent settlement between Scenario and Dynabook Technologies, Scenario plans to change the name of its product to DynaVision.

Dynabook Technologies' Dynabook 286 is a racy-looking portable equipped with a 16-MHz 80286 processor and either a 20- or 40-megabyte hard-disk drive. The svelte unit looks a great deal like last year's portable hit, the NEC UltraLite. But it is considerably more powerful than the diskless UltraLite and weighs nearly twice as much.

**The Dynabook 286 is sleek and powerful and weighs 7.6 pounds without the battery.**

Like the MinisPort, the Dynabook 286 is more an evolutionary than a revolutionary advance. Part of the Dynabook's appeal is its optional, removable LCD screen. The idea is that you just need to move data from location A to location B, and you have a CRT ready to plug in at both destinations. However, Institute for the Future's Saffo views this as minimal progress. "Dynabook lets you take just part of your computer with you—something you should have been able to do a long time ago."

One of the thornier problems facing portable manufacturers is the lack of compatibility among the ROM and RAM memory cards used in most of the newest portables. Right now there are no industry standards governing the size, pin placements, electrical characteristics, or data formats of these data-storage devices.

Recently, a group of hardware and software vendors, including Toshiba America, Fujitsu America, NEC, Poqet Computer, Lotus Development Corp., Microsoft Corp., and WordPerfect Corp., met with the intention of hammering out standards for these cards. John Reimer, the committee's acting chairman and marketing manager for Fujitsu's microcomputer and communications systems, says "chances are very good" that the committee can reach a consensus on industrywide standards.

### Beyond storage standards

Mark Eppley, president of Traveling Software (Bothell, Wash.) isn't as sanguine about the memory-card situation, which he describes as "a real mess right now." Eppley doesn't discount the usefulness of memory cards for data storage, but he claims that they will still add at least $100 to the cost of software.

Eppley thinks the industry should focus on lower-cost answers. One area worth exploring, he suggests, is the use of thin-film technology to boost the data capacity of magnetic material, such as the strips on the back of credit cards. Another possibility is the use of short-range packet-radio technology. A low-power radio link between signal devices attached to each system's serial port is a practical way to transfer data between computers with incompatible media, says Eppley. He predicts that eventually, advanced cellular radio systems, such as those beginning to appear in Europe, could let you transfer data between any two points without the need for traditional telephone connections.

Perhaps that's the final revolution in mobile computing—the elimination of fixed computing locations altogether. Louis Jaffe, director of research and development for American Teleconferencing Services (Kansas City, Mo.), believes that within 10 years portables will be able to handle 95% of our personal-computing needs. "There just won't be any reason," he says, "for most people's systems to be any larger." *—Richard Dalton*

## TAKE YOUR PRINTER ON THE ROAD

### *New models offer sharper print and less heft.*

Only 10% to 20% of those who own a mobile PC—that is, a laptop or a luggable—buy a portable printer to go with it. Some analysts predict that sales of such printers in the next few years will not match even that sluggish pace.

But portable-printer manufacturers hope to hitch a ride on the vigorous mobile-PC market, which analysts predict will grow an average of 25% per year from 1989 to 1991. Toward that end, several pint-size, under-five-pound printers recently appeared on the market. Besides being smaller and lighter, they have more fonts, sharper text and graphics, and better paper-handling capabilities than their predecessors.

The question is whether those improvements are enough to persuade most mobile-PC owners that they need a matching printer. Last year, according to International Data Corp. (IDC), a market research firm in Framingham, Mass., 102,000 portable printers were sold—about one for every eight mobile PCs sold. For 1992 IDC forecasts sales of nearly two million mobile PCs but predicts that only 304,000 portable printers will leave retailers' shelves.

But not all analysts are as conservative. "The portable-printer market is still in its infancy," says John Boldt, associate director of electronic printer industry services at the market research firm Dataquest (San Jose, Calif.). "I definitely see the ra-

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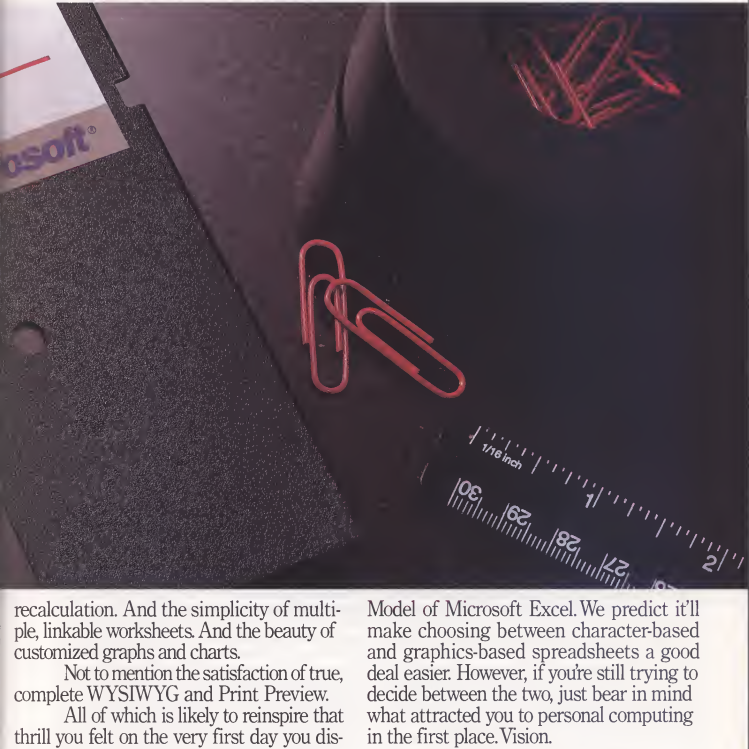

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tio of portable-printer to portable-PC sales going up—perhaps to 35%."

**Smaller is still possible**

Weight and size are still the major concerns of portable-printer buyers, according to an IDC survey conducted in February. Price and speed tied for second place, print quality took third, and battery operation came in last.

"In the past," says Karen Ruckman, brand manager for Eastman Kodak Co.'s Diconix line of portable printers, "users have had to trade away print quality to get a lightweight printer." But soon, she says, "the trade-offs will be minimal."

**The Toshiba ExpressWriter 301 weighs four pounds and fits neatly into a briefcase.**

Direct-thermal and thermal-transfer devices promise the greatest size and weight reductions, says Boldt, because they require the smallest mechanism. But advances in miniaturized circuits will help shrink all types of portable printers. The real limits are the imaging mechanism and the mechanics of moving paper through the printer.

The lightest of the new portables is Kodak's $499 Diconix 150 Plus ink-jet printer. With its battery, the 150 Plus weighs 3.7 pounds—the same as its predecessor, the 150. But it delivers better print quality. The characters are sharper, and the 150 Plus offers you a third print mode. In addition to a draft mode and a near-letter-quality mode, the 150 Plus

## WHAT 1-2-3 USERS SHOULD KNOW ABOUT UNIX

*Larry Bertram, Lotus's director of Unix products, talks about company strategy.*

The Unix operating system has been around since 1969. But until recently, it was a hit primarily with scientists and engineers using minicomputers and mainframes.

Three factors kept the microcomputer industry at arm's length. Most important, PCs prior to the 80386 were just not powerful enough to run Unix. In addition, software developers faced a discouraging number of competing and incompatible Unix versions. And from a user's standpoint, the operating system was somewhat impenetrable.

Today, the picture is different. International Data Corp., a Framingham, Mass., market research firm, predicts that by 1993 nearly 1.7 million PCs and technical workstations will be running Unix—an increase of more than 900% from 1987.

New graphical user interfaces from Sun Microsystems (Mountain View, Calif.) and from a consortium of hardware and software vendors, including IBM, called the Open Software Foundation (OSF), promise to make Unix easier to learn and use. And AT&T's Unix System V 4.0, scheduled for release before the end of the year, promises to unify several Unix variants, including earlier versions of AT&T's System V, Sun's SunOS, Microsoft's Xenix, and the Unix version developed at the Berkeley campus of the University of California that has become a research standard. As a result of these developments, many personal-computer software developers—Lotus included—are writing new programs for Unix or porting existing programs.

Over the summer Lotus announced plans to develop applications for Sun Microsystems' three Unix-based systems, including its RISC- (reduced instruction set computing) based Sparc computers. Lotus has also announced development deals with Digital Equipment Corp. (Maynard, Mass.) and Next Inc. (Palo Alto, Calif.), both of which make Unix-based machines.

In a July interview, we asked Larry Bertram, Lotus's director of Unix products, about Unix and *1-2-3*.

***LOTUS:*** Why has Lotus decided to jump on the Unix bandwagon?

**Bertram:** Most surveys are predicting that in the 1990s 20% to 25% of the market will be Unix-based systems. As a software vendor, our goal is to deliver a set of services that customers are going to keep investing in. We can't do that by ignoring Unix any longer.

***LOTUS:*** Why should Unix appeal to Lotus customers?

**Bertram:** Because customers want hardware-independent solutions. They're tired of investing in a proprietary world, and they're driving vendors toward a more open solution. The tools now available to software developers and users make Unix a very appealing platform for knitting a variety of disparate hardware, operating systems, and applications together. And you can build the links so that people don't have to spend all their time figuring out how to interface from one proprietary system to another.

Also, software vendors have the same problems customers have. We have to support all these different operating systems.

***LOTUS:*** What advantages will *1-2-3* have on a Unix machine as opposed to a DOS or an OS/2 machine?

**Bertram:** Fundamentally, *1-2-3* will take on the kinds of things you get for free with Unix, such as networking capabilities, concurrent multiuser access, and multitasking. Unix systems have been out there delivering this kind of between-the-mainframe-and-the-desktop functionality for 20 years. It's a very appealing platform.

***LOTUS:*** Will Lotus's Unix programs look and feel familiar to users of Lotus's DOS and OS/2 programs?

**Bertram:** We're working on a variety of interfaces, but initially our Unix products will look and feel very much like our DOS and OS/2 programs.

***LOTUS:*** How much memory would you need for a Unix machine running *1-2-3*?

**Bertram:** It depends on the number of network users and also gives you a letter-quality mode.

Another lightweight, Toshiba America's new $489 ExpressWriter 301, weighs four pounds, including battery. The thermal-transfer printer has a 24-wire printhead. To print, the wires heat up and melt a waxlike ink from the ribbon onto the paper. The printer comes with five fonts and accepts downloadable fonts. In graphics mode, the ExpressWriter 301 prints 360 dots per inch. But like most thermal-transfer printers, it needs special paper for the best inking results. Toshiba says you can use standard paper but admits that smooth, coated paper produces clearer characters.

A new portable printer from Axonix Corp. (Salt Lake City, Utah) also offers weight and print-quality improvements. The $449 LiteWrite dot-matrix printer is about 30% lighter than its predecessor, the ThinWrite 100. With batteries, the LiteWrite weighs just under five pounds. In near-letter-quality mode, the LiteWrite's nine-pin printhead makes multiple passes to produce sharp print, and the printer can use continuous-form paper, roll paper, single sheets, and envelopes.

### Beefed-up batteries

Against such improvements in weight and print quality, however, must be set the problem of speed. Portable printers are still slower than their desktop counterparts. For example, Kodak's Diconix 150 Plus, one of the fastest portables, operates at 180 characters per second (cps) in draft mode, much slower than the 310 cps of the Diconix desktop Model 300 ink-jet printer. And Toshiba's ExpressWriter 301 prints just 60 cps in draft mode. Battery operation is the culprit. The charge life for portable-printer batteries is usually not more than an hour, and a faster printer speed is likely to drain the battery even more quickly.

But advances in battery technology may soon speed up portable printers. Lithium batteries, which are lighter and have a higher energy capacity than nickel-cadmium batteries, will probably

the system configuration, but generally you'd be fine with a standard Sun3 computer.

***LOTUS:*** Why have you chosen Unix System V? Do you consider it the strongest of the standards?

**Bertram:** In so far as it's possible, we are trying to direct the desktop-Unix market toward a point where users can choose from a body of readily available, simple-to-install software packages. In order to do that, you have to get the standard to some level of consistency.

System V is available today and brings together a wide variety of platforms. For example, System V/386 [for 80386-based PCs] and ultimately System V 4.0 will incorporate AT&T Unix, Berkeley Unix, SunOS, and Xenix.

When the Open Software Foundation has a standard we can work with, we will do so. Our hope is that System V and the OSF standard will congeal into one. And we continue to work with both the X-Open Company [San Francisco] and the IEEE [Institute of Electronics and Electrical Engineers] on interface and installation standards.

***LOTUS:*** What are the technical challenges in rewriting *1-2-3* to run under Unix?

**Bertram:** In theory, it's relatively straightforward; in practice, it's not. You know, *run* and *perform* are two different things. Processor architectures are different, and to optimize applications such as ours, we often have to reach down into the hardware and operating system. We won't be taking the typical software-port approach. There are nitty-gritty issues such as byte alignment, padding structures, and memory use in general that make porting to Unix more than just a matter of recompiling the program.

***LOTUS:*** Is programming for a RISC environment, such as Sun's Sparc systems, much different from programming for DOS and OS/2 platforms?

**Bertram:** At certain levels, absolutely. Particularly when we try to optimize and fine-tune performance.

***LOTUS:*** How big a market do you envision for Unix-based Lotus applications, and who will use them?

**Bertram:** We think the stakes are big. The federal government alone, by virtue of spending hundreds of millions of dollars a year on Unix systems, could justify our doing this work. But the exciting part is moving Unix into mainstream commercial markets. Plenty of financial-services people on Wall Street will be excited about what we're doing. We also think Fortune 500 business users will be excited about what we're doing, especially when you consider the price and performance numbers for some of these platforms. For example, in the very near future, you could be looking at a 10-megabyte, 10-MIPS [million instructions per second] machine for under $6,000 or $7,000. ■

ERIC ROTH

show up next year. Even more promising, says David Cox, Axonix's vice president of marketing, are nickel-hydrogen batteries. "They could double the charge life of a battery the same size and weight as those being used today."

Other improvements in printing technology have yet to move from desktop printers to portables. Hewlett-Packard Co., for example, has greatly improved the ink-jet mechanism in its DeskJet printer but has not yet brought those advances to its ThinkJet portable. Kodak and other manufacturers are also working toward bringing desktop-printer features, including higher resolutions and greater speed, to their portable models.

Cox thinks that in the next year or two we will probably see portable color printers that use thermal-transfer technology. In three to four years, he says, some manufacturer will produce a portable laser printer. Such advances may kick the portable-printer market into high gear.

"As portable printers get better," says Diane Garay, product manager for Toshiba's ExpressWriter 301, "more people will find a use for them."

*—Henry Fersko-Weiss*

## OUTLINING IS NOT JUST FOR STUDENTS ANYMORE

*The technique brings a new perspective to spreadsheets.*

Outlining is one of those fundamental skills we learned in grade school. Developers of word-processing programs certainly recognize its utility, so it's not surprising that many packages now include it. Outlining fits naturally within such programs—after all, we learned the technique within the context of writing.

Outlining techniques are also useful in applications other than word processing. Project-management programs and database and financial add-ins for *1-2-3* and other spreadsheets are putting this tried-and-true technique to good use. Outlining will be used as a file-organizing tool in OS/2's Presentation Manager, and vertical-market manufacturers are also eyeing the technique. Before long, outlining may become one of the most ubiquitous of all PC tools.

"Almost invariably, when a stand-alone utility becomes successful, the next generation of word processors absorbs it, making it a standard feature," says Jeffrey Tarter, publisher and editor of *Softletter*, an industry newsletter published in Cambridge, Mass. "It happened with spelling checkers, and now it's happening with outlining utilities."

Most of the best-selling word processors now have outlining facilities built in. "Within a couple of years, if a word processor doesn't have [outlining], the serious user won't buy it," says Melinda French, associate product manager for the PC version of *Microsoft Word* 5.0, from Microsoft Corp. (Redmond, Wash.). Her program, with a suggested retail price of $450, was released in May with a much-improved outlining feature. For one thing, it lets users easily add an outline structure to existing documents.

The purpose of an outline is to help crystallize ideas. But outlining also has side benefits that prove alluring to word-processor users. Within an outline structure, document sections and subsections can be moved as a group—letting you reorganize a document much faster than if you had to move them individually.

Lotus Development Corp. had these benefits in mind when it designed *Lotus Manuscript* ($495). It is the only word processor built around outlining. "The outline facility is what makes *Manuscript* so fast and agile with text," says Alan Minard, senior product manager for the Documents Product Group at Lotus.

*Manuscript* lets you define separate typographical formats for nine outline levels. Each level can have a different setting for typeface, line spacing, indentation, and justification. If you change a setting for any level, the change is reflected automatically in all appropriate parts of the document. If you move a block of text from one level to another, its format also changes automatically.

### Group efforts

Flexibility in viewing is another important advantage of computerized outlining. At the press of a key, you can collapse or expand subsections, which means you can choose to see just the top-level headlines of a document or any level of detail. This is important, says Microsoft's French, because often groups and departments, not an individual, create documents. In these situations, outlining can show each person's thought process before the detailed writing begins.

The producers of stand-alone outlining programs recognize that most people use their products as a prelude to writing. So they have been incorporating word-processing features into their programs. The result is that such products as *PC-Outline* ($195, from Brown Bag Software, Campbell, Calif.) and *GrandView* ($295, from Symantec Corp., Cupertino, Calif.), can function as low-end word processors. "Many of our users do all their word processing in our program," claims Sandy Schupper, chairman of Brown Bag. In fact, stand-alone outliners have evolved so much that they've spawned a whole new software category: personal information management.

*GrandView* is an excellent example of this type of product. It's a cross between a word processor and a database manager. Like other outliners, *GrandView*

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lets you arrange text in a numbered hierarchy. You can view any level of the hierarchy or read blocks of attendant text. The word-processing part of the program is adequate for most tasks and even supports proportionally spaced type and different fonts for Hewlett-Packard's LaserJet printers.

The program's database component lets you assign category names, or keywords, to hierarchy items. This allows you to review all the text that has a common keyword. "You can view a file by any category," says John Friend, *GrandView*'s author. In addition, you can slice your data by department, by due date, or by peoples' names, as well as assign priorities to items.

Several popular project-management applications now use outlining as a major project-planning tool. These programs include *Time Line* ($595, from Symantec Corp.), *SuperProject Plus* and *SuperProject Expert* ($395 and $695, respectively, from Computer Associates International, San Jose, Calif.), and *Harvard Project Manager* ($695, from Software Publishing Corp., Mountain View, Calif.).

In a project-management outline, the levels consist of tasks or activities rather than blocks of text. The top level of the outline is a broad description of the whole project. Successive levels show the project in finer and finer detail—from summarized subtasks to specific, individual tasks.

### Different levels of detail

As with text outlines, you can collapse or expand levels of project-management outlines. "This makes the outline an incredibly efficient tool for viewing a project from different managerial perspectives," says Robert Monroe, marketing manager for Computer Associates, developers of *SuperProject Plus* and *SuperProject Expert*. While top management may want to see just the top-level summaries, line managers need the detail.

The outliners in project-management programs do more than organize tasks into phases, however. They also automatically total all costs, time, and materials from one level to the next. When you look at just the top-level phases, for example, you get a quick overview that tells you if a phase is significantly late or over budget. Then you can drop down through succeeding levels until you find the problem.

Also available are add-in programs that bring outlining features to *1-2-3* spreadsheets. *Silverado*, a $149 database add-in from Computer Associates, is one such program. The company plans to release a version for *SuperCalc 5* as well.

*Silverado* breaks database data into levels of detail, says Eric Michelman, the program's author. Let's say you have a sales database arranged by product category, model numbers, and dates. With just a couple of keystrokes, he says, you can see subtotals by month or by model number or product type. The program calculates subtotals automatically; you don't have to enter formulas to generate them. Another *1-2-3* add-in, *@Base* ($195, from Personics Corp., Maynard, Mass.), performs similar functions.

### Financial-statement outlines

Michelman has written another *1-2-3* add-in called *The Budget Express* ($149, from Symantec Corp.). *Budget Express* works with financial worksheets, such as budgets, balance sheets, and income statements. The line items in these worksheets are organized hierarchically and indented to show subordinate layers. "If you look down the left side of the worksheet, it looks just like a text outline," says Michelman.

It's common for budgets and balance sheets to be indented, but outlining makes this format more meaningful. When you collapse the details, only the subtotals and totals are left.

*Budget Express* also lets you outline across the columns, which in financial spreadsheets almost always reflect time. Thus you can subtotal by month, quarter, or year. You don't have to assign these periods when you set up your column headings. The program does this for you.

Because of its outline structure, *Budget Express* also lets you hide worksheet areas and protect them with passwords. A budget, for example, might show just the salary totals by department, while individual salaries could be uncovered only by someone who knows the password. (For more on *Budget Express*, see the May issue, page 106.)

Some vendors predict that the flexibility that outlining brings to text and spreadsheet applications will reach into other areas as well. One area, says Andrew Layman, vice president of development for Symantec Corp., is groupware—software designed specifically for use by multiple users connected on a network. —*Henry Fersko-Weiss*

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CIRCLE 104 ON READER SERVICE CARD

## PC FAXING GETS EASIER

A little more than a year ago, PC fax boards were, to put it mildly, difficult to use. The software that came with the early PC fax boards was about as easy to decipher as counterintelligence codes. Now all that is changing. Thanks to a communications standard called the Communicating Applications Specification (CAS), developed by Digital Communications Associates (DCA) and Intel Corp., you will soon be able to send and receive faxes without leaving your favorite application.

Intel is already shipping a software add-in called *Send-Off!* for its Connection CoProcessor board. The program works with the Connection CoProcessor's fax modem to let you send or receive faxes and files from within *1-2-3* or *WordPerfect*. The program's retail price is $50, but Intel is offering its *1-2-3* and *WordPerfect* 5.0 versions of *Send-Off!* free to registered users of the Connection CoProcessor. (For more on *Send-Off!*, see page 105 in the May issue.)

Other fax-board manufacturers and software vendors, including Ashton-Tate, Borland International, Microsoft Corp., Lotus Development Corp., and Symantec Corp., have also pledged support for CAS. The CAS-compatible programs currently available include Symantec's *Q&A* 3.0, Borland's *SideKick Plus*, and DCA's *CrossTalk Mark IV*. In the near future, you can expect to encounter even more often the already ubiquitous question, "What's your fax number?" *—Jon Pepper*

## BASIC TURNS 25

The BASIC programming language celebrates its 25th anniversary this year. That makes it ancient by computer-industry standards, but it's still alive and quite well.

Dartmouth professors John G. Kemeny and Thomas Kurtz developed the language in 1964 to help students become more computer literate. Eleven years later, Microsoft Chairman Bill Gates and Paul Allen, owner of the Portland Trailblazers, wrote the first microcomputer version of BASIC for the MITS Altair 8800. The code took all of 4K of RAM. By comparison, Microsoft's latest version, QuickBASIC 4.5, uses 384K of memory.

A study commissioned by Microsoft shows that approximately four million MS-DOS users wrote programs in BASIC last year. That's three times as many programmers as any other language can claim (Pascal came in second, Fortran was third). And according to *Byte* magazine, 77% of the companies it surveyed in 1989 use BASIC, followed by *dBase* (66%) and C (61%).

Microsoft says it will keep improving BASIC. The company is even working on an object-oriented version of the language. *—Rich Friedman*

## 4-MEGABIT MEMORY CHIPS MOVE INTO PRODUCTION

IBM is producing a 4-megabit memory chip. Since late 1987 the standard memory chip has been 1 megabit. But IBM's new chip packs 4 megabits into the same space as the 1-megabit chip. The chip's circuit patterns are as small as 0.8 micrometers (millionths of a meter) wide, or nearly 150 times thinner than a sheet of typing paper. The chip can store about 400 pages of double-spaced text.

To achieve a density of 4 million bits, IBM developed a three-dimensional "trench" architecture for its chip. The chip's capacitors are etched deeply into the silicon rather than placed on the surface. As a result, nearly 48,000 capacitors can fit in an area the size of a period.

The 4-megabit chip will allow computer makers to build yet smaller and more powerful machines. But the price of the new technology is still high compared to the cost of producing a 1-megabit chip. According to Dataquest, a 4-megabit chip today costs 10 times as much to produce as a 1-megabit chip. But the San Jose, Calif., market research firm predicts that by 1991, the manufacturing costs for 1- and 4-megabit chips will be equal.

IBM recently announced a 4-megabit-chip expansion board for its PS/2 Models 70, P70, and 80. The 4-megabit card is available now in limited quantities and carries a suggested retail price of $3,495. The card will be generally available in the first quarter of 1990. *—R. F.*

## MOVE OVER, RODNEY DANGERFIELD

What does the computer industry need most? No, not a less expensive '486. What it needs is a sense of humor. Trying to fill that void is *The Computer Comic*, a memory-resident program from Keyboard Comedy (La Jolla, Calif.) that offers the computer equivalent of Dial-a-Joke. Add the $24.95 program to your AUTOEXEC.BAT file, and when you turn on your computer, the following quip might pop up: "The speaker of the house was arrested because he didn't know Wright from wrong."

The program has a "hot key" that will pop up a joke over your application, then return you to where you left off. It's unlikely that the Las Vegas pros will be stealing its material, but the next time your spreadsheet figures look gloomy, you might ask *The Computer Comic* for some relief: "What does a politician eat for breakfast? Anything shredded." *—J. P.*

GREG COUCH

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## LOTUS ADD-IN TOOLKIT FOR RELEASE 3

At press time Lotus Development Corp. expected to ship the Lotus Add-In Toolkit for Release 3 in September. With the Toolkit, developers can create tightly integrated enhancements to *1-2-3* Release 3, from custom @functions and macro keywords to complete applications.

The Add-In Toolkit costs $395 and comes with an editor, a compiler, a debugger, and the *1-2-3* Release 3 Library, which gives developers access to the internal *1-2-3* code. To order, call Lotus Selects at 1-800-635-6887, or contact a Lotus-authorized dealer.

## DATALENS DEVELOPER TOOLKIT

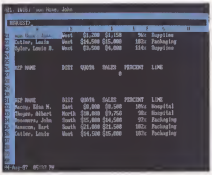
Lotus has released the DataLens Developer Toolkit to help programmers write DataLens drivers that connect external data to Lotus's DOS and OS/2 applications. The DataLens drivers in *1-2-3* Release 3, for example, let you use the Data External command to query or update data in a *dBase* file.

The Toolkit contains an architectural overview of the technology, the DataLens specification, and a disk containing code libraries, diagnostic tools, and a test application that lets programmers verify the integrity of their drivers. New drivers will be listed in the DataLens Driver Directory, which Lotus will update quarterly and distribute to all Lotus sales and service personnel. The first issue of the directory is due out this month.

The DataLens Developer Toolkit costs $250. To order, call Lotus Direct at 1-800-345-1043.

## NO LOTUS HAL FOR RELEASES 2.2 OR 3

*Lotus HAL*, Lotus Development Corp.'s natural-language add-in for *1-2-3* Release 2.01, will not work with *1-2-3* Releases 2.2 and 3. According to a Lotus spokesperson, the company has no plans at this time to rework *HAL* for those programs. Lotus will continue to sell and support *HAL* for *1-2-3* Release 2.01.



```
A21: [W18] 'von Hone, John

REQUEST>_
      A                B      C       D          E F  G          H
21 von Hone, John    West    $1,200  $1,150     96% Supplies
22 Cutler, Louis     West   $14,500 $15,000    103% Packaging
23 Tyler, Louis B.   West    $3,500  $4,000    114% Supplies
24
25
26 REP NAME          DIST   QUOTA   SALES   PERCENT  LINE
27                                       0
28
29
30
31 REP NAME          DIST   QUOTA   SALES   PERCENT  LINE
32 Macey, Edna M.    East    $8,000  $8,500    106% Hospital
33 Thoyen, Albert    North  $10,000  $9,750     98% Hospital
34 Desmara, John     South  $15,000 $14,500     97% Packaging
35 Hanscom, Bart     South  $21,000 $21,500    102% Packaging
36 Cutler, Louis     West   $14,500 $15,000    103% Packaging
37
38
39
40
04-Aug-87  05:37 PM
```

***Lotus HAL*'s natural-language syntax lets you ask for a list of top sales reps by typing *who has sales ≥ 8000.***

However, Lotus did incorporate a few of *HAL*'s most popular features into Releases 2.2 and 3. These include the Undo function, a file-linking capability, and a search-and-replace function.

In Releases 2.2 and 3, the Undo feature reverses the last action you took, making it easier to recover from errors. However, *1-2-3* Release 2.2 accomplishes this by storing in memory a complete copy of the previous state of the worksheet. This means that with a very large worksheet, you may not have enough memory for both the worksheet and the copy. In this case, you can turn off the Undo feature manually.

The programs' File Linking feature lets you link individual cells in one worksheet to individual cells in other worksheets. In *1-2-3* Release 3, for example, formulas can reference not only cells in the active worksheet but also cells in other worksheet files.

The Search and Replace functions in both programs let you search formula and label cells for text and perform individual or global replace operations.

## SYMPHONY UPGRADE CONTAINS ALLWAYS

Lotus Development Corp. expected to ship *Symphony* Release 2.0 Plus sometime in September. This *Symphony* upgrade contains *Allways*, the spreadsheet-enhancement add-in that Lotus acquired from Funk Software (Cambridge, Mass.) earlier this year. *Allways* allows users of *Symphony* Release 1.1 and higher to prepare presentation-quality output with mixed text and graphics from within a *Symphony* spreadsheet.

Previously, Lotus-authorized dealers were bundling *Allways* with *Symphony* at *Symphony*'s retail price of $695. The *Symphony* 2.0 Plus upgrade is available only through Lotus and costs $125. With it you get *Symphony* 2.0 and the *Allways* add-in, plus new documentation and full Lotus support for both programs. Frank Ingari, Lotus vice president and general manager of the PC Spreadsheet Division, has stated that Lotus's ultimate goal is to incorporate the *Allways* technology directly into *Symphony*.

For more information or to order, call Lotus Selects at 1-800-635-6887, or call 1-800-TRADEUP.

Funk Software will continue to sell the *Allways* add-in to users of *Symphony* Releases 1.1 and 2.0. Sold separately, *Allways* has a retail price of $149.95.

In its WYSIWYG (what-you-see-is-what-you-get) display, *Allways* lets you use different type styles, weights, and sizes within individual cells or over entire ranges. You can use up to eight fonts on a page, and each font may be bold, underlined, or both. You can vary row heights to accommodate larger type sizes and dress up a worksheet with background shading, boxes, borders, and grids.

*Allways* is PostScript-compatible and works with the native fonts of popular laser and dot-matrix printers. The program also provides you with additional fonts on-disk.

## ONE SOURCE ON MERGERS AND ACQUISITIONS

Lotus Development Corp. and IDD Information Services announced CD/M&A, a new addition to Lotus's One Source family of databases delivered on CD-ROM (compact disk, read-only memory).

CD/M&A, combined with Lotus's analysis, screening, and reporting software, is designed to let merger-and-acquisition specialists analyze potential deals. It features IDD data on more than 30,000 publicly announced transactions, including mergers, acquisitions, and buybacks, from public and private companies. It also contains two years or more of historical financial data—balance sheets, income statements, fund flows, and earnings—on publicly traded companies.

CD/M&A is updated monthly. A subscription costs $20,000 per year ($15,000 when purchased with another One Source product). You need an IBM PC AT, PS/2, or compatible computer with 1 megabyte of RAM. A CD-ROM reader is included in the subscription price.

## LOTUS IN JAPAN

In August Lotus Development Corp. announced that Lotus Development Japan—the company's Japanese subsidiary—had sold more than 200,000 copies of *1-2-3* Release 2J, the Japanese version of *1-2-3*.

According to the July issue of *Nikkei Byte* magazine, no fewer than eight Japanese spreadsheets have been introduced in 1989, and spreadsheet shipments in Japan are increasing 50% per year.

Since a month after *1-2-3* Release 2J was introduced in September 1986, the program has been at or near the top of the prestigious Nikkei Sangyo Shimbun ranking of Japan's best-selling business software. It took Lotus Development Japan until August 1988—nearly two years—to sell the first 100,000 Release 2J packages, but it took less than another year to sell 100,000 more.

*1-2-3* Release 2J combines the key features of the English-language program with enhancements demanded by Japanese users, such as sophisticated kana-to-kanji conversion and additional graph types. The program sells for ¥98,000 in Japan—about $695, depending on currency fluctuations.

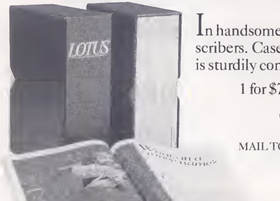
## LOTUS TO SHIP NEW 1-2-3 NETWORK VERSIONS

The network version of *1-2-3* Release 3 was expected to ship in September. The program will work with several popular networks, including IBM PC LAN Programs 1.2 and 1.3, 3Com 3+Share 1.3, Novell SFT Netware version 2.15, and Banyan Vines/3.0. It will also work on networks compatible with OS/2 Extended Edition 1.1, including IBM OS/2 LAN Server Version 1.0, 3Com 3+Open LAN Manager 1.0, and Novell NetWare Requester for OS/2 version 1.1.

The Server Edition of the program, intended for installation on a network server, contains one software license, one set of program disks, one copy of the documentation, special network documentation, and network-administration software. The Node Edition provides an additional network license and set of documentation.

Suggested retail prices for Server and Node Editions are $695 and $395, respectively, for *1-2-3* Release 3. However, if you bought *1-2-3* Release 2.01 Networker between September 6, 1988, and August 31, 1989, you may upgrade free to Release 3 Networker or Release 2.2 Networker until December 31, 1989. Each Networker product contains one Server Edition and four Node Editions.

The network version of *1-2-3* Release 2.2 is expected in the fourth quarter. It will work on networks compatible with DOS 3.1 and higher and will cost $595 and $295, respectively, for the Server and Node editions. For more information, call 1-800-TRADEUP. ■



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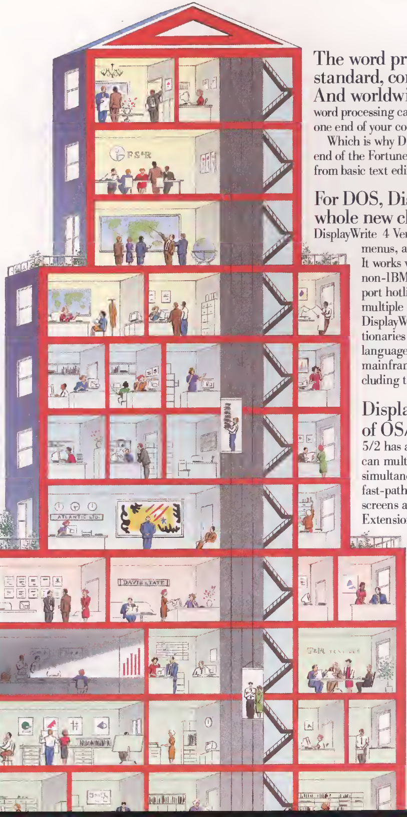

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## START HERE

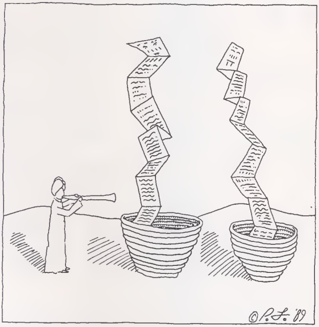
# MANAGE LISTS

**Improve your computing prowess by learning how to find information in a *1-2-3* database.**

BY DANIEL GASTEIGER

A database is no more than a collection of information. *1-2-3* lets you store information in lists so that you can sort the information easily and find entries quickly—without skimming all the entries until the one you want surfaces.

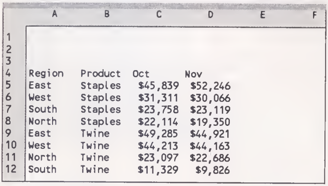
Last month's discussion explained how to use the Data Sort command to alphabetize records and put them in numeric order. Let's continue the discussion and learn how to find specific records wherever they may reside in the database.



PAUL FISCH

### A SIMPLE DATABASE

Remember that a database record in *1-2-3* occupies a single row of the worksheet. Each discrete datum in a record falls in its own column or field. For example, the records in the database shown below have four fields: *Region*, *Product*, *Oct*, and *Nov*. Each record represents the sales of a product in a given region for the months of October and November.



| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | Region | Product | Oct | Nov | | |
| 5 | East | Staples | $45,839 | $52,246 | | |
| 6 | West | Staples | $31,311 | $30,066 | | |
| 7 | South | Staples | $23,758 | $23,119 | | |
| 8 | North | Staples | $22,114 | $19,350 | | |
| 9 | East | Twine | $49,285 | $44,921 | | |
| 10 | West | Twine | $44,213 | $44,163 | | |
| 11 | North | Twine | $23,097 | $22,686 | | |
| 12 | South | Twine | $11,329 | $9,826 | | |

---

*Daniel Gasteiger is president of Tenet Educational and a contributing editor to* LOTUS.

If you already built this worksheet, which was used in last month's Start Here column, retrieve it. Then move the pointer to cell A1. Press slash and select Worksheet Insert Row, press the DownArrow key twice, and then press Return. If you haven't built it yet, enter the database in a blank worksheet so that you'll be able to follow the balance of this discussion. Begin by entering the labels shown in range A4..D4 and in range A5..B12.

When you enter the numbers in range C5..D12, remember to omit the dollar signs and the punctuation. Enter only the digits. Once you've entered all the values, use the Range Format Currency command to assign the Currency format with zero decimal places.

Your database should be ready for the exercise. If you weren't able to build it exactly as it appears in the magazine, perhaps you should go back and work through the Start Here articles that introduce the worksheet and explain cell entries and formats.

### PREPARE TO FIND

You can find database entries simply by moving the cell pointer around in the worksheet. For a very small database, this is a simple task. However, when a database contains tens, hundreds, or even thousands of records, eyeballing the data is inefficient.

If you have a good idea of what records you'd like to see, *1-2-3* can illuminate them quite rapidly. You do, however, need a little advance preparation. You must be able to tell *1-2-3* which records to show you. To do this, you create a Criterion range.

At its simplest, a Criterion range consists of only two adjacent cells in a single column. The first of the two cells contains a field name that matches one of the database field names. The second cell contains the criterion that will be used to identify matching data.

Create a Criterion range above your database by entering the label *Product* into cell B1. Then move the cell pointer to cell B2 and enter *Twine*. We're going to ask *1-2-3* to reveal each of the records that contains the word *Twine* in its *Product* field. To do this, you resort to the menus.

IN A DATABASE OF THIS SIZE, THIS TYPE OF QUERY SEEMS HARDLY WORTH THE EFFORT. HOWEVER, IN A MUCH LARGER DATABASE, FINDING RECORDS SO EASILY CAN SAVE HOURS OF PAINSTAKING KEY PRESSING.

Press the slash key, and select Data Query Input. *1-2-3* prompts you to identify the Input range, which is the range that contains the entire database, including the database field names. Indicate it either by highlighting or by entering the range coordinates, in this case range A4..D12. Now *1-2-3* knows what area of the worksheet contains the database.

Identify the Criterion range by selecting Criterion from the Data Query menu. *1-2-3* prompts you to indicate a range; indicate range B1..B2. Now select Find from the Data Query menu.

Instantaneously, the cell pointer expands and highlights the entire record in row 6. This is the first of four records that contain the label *Twine* in the *Product* field. To highlight the next three matching records, press the DownArrow key three more times. If you press DownArrow once again, *1-2-3* beeps to alert you that there are no other matching records in the database. (If there were more records whose entries in the *Product* field matched those in the Criterion range, you could navigate among them by pressing the UpArrow and DownArrow keys.) When you finish browsing through the records, press the Return key, and *1-2-3* returns you to the Data Query menu. Now select Quit.

## OTHER QUERIES

Suppose that you want to locate all the records for sales in the East region. As it stands, the Criterion range can't handle the job. Having only one field name in the Criterion range, in this case *Product*, limits you to records based on the entries in that particular field. Let's expand the Criterion range to handle a search based on any field.

It's easiest to create a Criterion range by copying the field names from the Database range. Select /Copy and indicate range A4..D4 as the range to copy from and cell A1 as the range to copy to.

Now select /Data Query Criterion, press Escape, and indicate range A1..D2 as the new Criterion range. Select Quit to exit from the Data Query menu.

You're going to ask *1-2-3* to find all the records for the East region, so enter *East* into cell A2—in the *Region* column of the Criterion range. And, because you're no longer interested specifically in the *Twine* records, erase the entry from cell B2. To erase an entry, you select /Range Erase, indicate the cell to erase, and press Return.

The Criterion range is ready. With the label *East* in the range's *Region* column, the Data Query Find command illuminates only the records of sales for the East region. Select /Data Query Find, and then use the UpArrow and DownArrow keys to confirm this.

Notice that when *1-2-3* highlights the first of the matching database entries, the cursor in column A flashes. This cursor is important. You can alter or replace the entry in whatever cell holds the cursor during a Data Query Find operation.

For example, the database shows that November twine sales in the East district totaled $44,921. Let's assume that you entered that value incorrectly. To modify the entry, use the UpArrow and DownArrow keys to highlight row 9. Then press the RightArrow key three times and move the cursor to the record's *Nov* field.

At this point you can type the correct total—let's say, 45,921—and press Return to replace the existing entry, or you can press the EDIT key, modify the entry, and then press Return. Whichever method you use, *1-2-3* continues the Data Query Find operation after you press Return. If you wish, you can move the cursor to another field or record and make another change. When you finish viewing and modifying matching records, press Return and *1-2-3* returns you to the Data Query menu.

## ON YOUR OWN

So far you've done only the simplest database queries. In a database of this size, this type of query seems hardly worth the effort. However, in a much larger database, finding records so easily can save hours of painstaking key pressing.

Try a few Data Query operations on your own. Change the criterion so that *1-2-3* will find only the records from the South region. Or have *1-2-3* find all the records for staples. When you've experimented with these simple queries, predict what will happen when you enter criteria in both the *Product* and *Region* columns of the Criterion range, and then test your hypothesis. And don't forget to save the file.

In the next issue we'll write some more-complex criteria, and we'll see how to copy matching records from the database to another area of the worksheet. ■

# HOW TO CREATE A VERTICAL LIGHT-BAR MENU

### Bypass the {MENUBRANCH} command to produce center-screen menus.

BY NICK DELONAS

Those of you who create your own menus in *1-2-3* probably use the {MENUBRANCH} command. But it does have its drawbacks.

When you use the {MENUBRANCH} command, *1-2-3* can display your custom menu only at the top of the screen. The command limits you to a maximum of eight menu options. And {MENUBRANCH} also restricts you to a specific number of characters. The more menu items you include, the fewer total characters *1-2-3* allows. To be specific, the character limit equals 82 minus twice the number of menu choices. For example, to display eight menu items, the spreadsheet limits you to a total of 66 characters, or an average of about eight characters per menu choice.

If these limitations frustrate you, read on. You'll learn techniques that overcome the restrictions of the {MENUBRANCH} command and let you create effective menus that *1-2-3* displays in the center of the screen. You'll also learn how to use the {DISPATCH} command to branch to a macro routine.

## THE LIGHT-BAR MENU

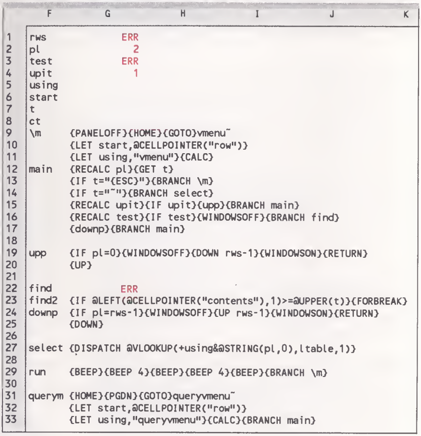
A light-bar menu is simply a menu that allows you to select an option by moving a highlighting pointer. The standard menu system created with the {MENUBRANCH} command is, itself, a light-bar menu. So navigating through a custom vertical light-bar menu is intuitive for a *1-2-3* user. He or she will quickly recognize the light-bar style and adjust to the center-screen format.

To create a simple menu system that is run by the macro shown in figure 1, follow the instructions in the setup box found on page 24.

To run the menu macro, hold down the MACRO key (Alt on most computers) and press M.

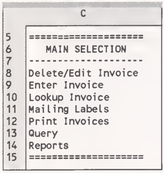
When you run the macro, *1-2-3* presents you with a center-screen menu called Main Selection (see figure 2 on the next page). The macro highlights the first option, Delete/Edit Invoice. If you press the UpArrow or DownArrow key, the highlight moves up or down accordingly. If you press the UpArrow key when the highlight is on the first menu option, the highlight jumps to the last choice in the list. Similarly, if you try to scroll beyond the last choice, the highlight jumps to the first choice in the menu.

Pressing the RightArrow key has the same effect as pressing the DownArrow key. Pressing the LeftArrow key or the Backspace key has the same effect as pressing the UpArrow key.



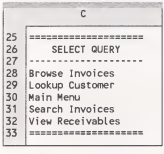
```
         F          G              H              I              J              K
1   rws             ERR
2   pl                2
3   test            ERR
4   upit              1
5   using
6   start
7   t
8   ct
9   \m      {PANELOFF}{HOME}{GOTO}vmenu~
10          {LET start,@CELLPOINTER("row")}
11          {LET using,"vmenu"}{CALC}
12  main    {RECALC pl}{GET t}
13          {IF t="{ESC}"}{BRANCH \m}
14          {IF t="~"}{BRANCH select}
15          {RECALC upit}{IF upit}{upp}{BRANCH main}
16          {RECALC test}{IF test}{WINDOWSOFF}{BRANCH find}
17          {downp}{BRANCH main}
18
19  upp     {IF pl=0}{WINDOWSOFF}{DOWN rws-1}{WINDOWSON}{RETURN}
20          {UP}
21
22  find            ERR
23  find2   {IF @LEFT(@CELLPOINTER("contents"),1)>=@UPPER(t)}{FORBREAK}
24  downp   {IF pl=rws-1}{WINDOWSOFF}{UP rws-1}{WINDOWSON}{RETURN}
25          {DOWN}
26
27  select  {DISPATCH @VLOOKUP(+using&@STRING(pl,0),ltable,1)}
28
29  run     {BEEP}{BEEP 4}{BEEP}{BEEP 4}{BEEP}{BRANCH \m}
30
31  querym  {HOME}{PGDN}{GOTO}queryvmenu~
32          {LET start,@CELLPOINTER("row")}
33          {LET using,"queryvmenu"}{CALC}{BRANCH main}
```

**FIGURE 1**



```
         C
5  ===================
6     MAIN SELECTION
7  -------------------
8  Delete/Edit Invoice
9  Enter Invoice
10 Lookup Invoice
11 Mailing Labels
12 Print Invoices
13 Query
14 Reports
15 ===================
```

**FIGURE 2**



```
         C
25 ===================
26    SELECT QUERY
27 -------------------
28 Browse Invoices
29 Lookup Customer
30 Main Menu
31 Search Invoices
32 View Receivables
33 ===================
```

**FIGURE 3**

You can also move the pointer to any menu option simply by typing the first letter of that option. If you type a letter that does not correspond to a menu option, the pointer will move to the next-higher letter available. For example, if you type *j*, the macro highlights the Lookup Invoice option.

To select a menu option, highlight it and press Return. Every option here calls a dummy macro routine except Query, which calls up the Select Query menu, shown in figure 3. The Select Query menu works the same as the main menu. If you select a dummy option, the macro simply sounds five beeps and moves the highlight back to the first option in the Main Selection menu. Pressing the Escape key has the same effect, but without the beeps.

To halt macro execution, hold down the Control key and press Break, then press Escape.

Here's how the macro works:

**{PANELOFF}{HOME}{GOTO}**vmenu~ freezes the control panel and sets up the initial menu screen. The pointer highlights the first menu option, since it corresponds to the first cell in the range *vmenu*.

**{LET start,@CELLPOINTER("row")}** enters the row number of the current cell in *start*.

**{LET using,"vmenu"}{CALC}** enters the label *vmenu* in the cell named *using*. The macro recalculates the worksheet to update the formulas in *rws* and *find*. The formula in *rws* determines the number of menu options there are in the range name identified by the label in *using*. Initially, the range name in *using* is *vmenu*, so *rws* returns 7. The string formula in *find* (cell G22) depends on the label in *using* to supply the destination for its {GOTO} command.

**{RECALC pl}{GET t}** recalculates the formula in *pl*. This formula determines the current cell's relative position in the menu. So if the cell pointer is on the second option, this formula returns 1. If the pointer is on the fourth option, this formula returns 3. The macro then pauses to accept a key entry and stores that key entry in *t*.

**{IF t="{ESC}"}{BRANCH \m}** loops macro control to the beginning of the *\m* routine if *t* contains {ESC}. So if you press the Escape key, macro control loops to the beginning.

**{IF t="~"}{BRANCH select}** passes macro control to *select* if *t* contains a tilde. So when you press Return to select a menu option, the macro runs the *select* routine.

Here's what the *select* routine does:

**{DISPATCH @VLOOKUP(+using&@STRING(pl,0), ltable,1)}** passes macro control to the macro routine that corresponds to the current menu option. This is where the *ltable* range comes into play. In *ltable*, range L1..M12, there's a table that identifies menu options and their associated macro routines. You identify each menu option with a label that consists of the menu range name followed by the option number.

Most of the menu options in this case process a dummy routine named *run*. The *run* routine merely sounds five beeps and passes macro control to the *\m* routine. The Query option of the Main Selection menu corresponds to *vmenu5* in the table. The associated macro routine is *querym*. That routine brings up the Select Query menu.

Here's how the *querym* routine works:

**{HOME}{PGDN}{GOTO}**queryvmenu~ positions the Select Query menu in the center of the screen and moves the cell pointer to highlight the first menu option.

**{LET start,@CELLPOINTER("row")}** enters the current cell's row number in *start*.

**{LET using,"queryvmenu"}{CALC}{BRANCH main}** enters the label *queryvmenu* in *using* to identify the current menu screen.

Now let's go back and finish analyzing the *main* routine. If the macro doesn't pass control to *select*, macro processing continues as follows:

**{RECALC upit}{IF upit}{upp}{BRANCH main}** recalculates the formula in *upit*. That formula determines whether you've pressed the UpArrow key, the Backspace key, or the LeftArrow key. If *upit* finds that one of those keys has been pressed, the macro calls the *upp* subroutine and then loops macro control to the beginning of *main*.

Here's what the *upp* subroutine does:

**{IF pl=0}{WINDOWSOFF}{DOWN rws-1}{WINDOWSON}{RETURN}** determines whether the cell pointer is highlighting the first option in the menu. If it is, the macro freezes the screen. It then moves the pointer to the last option in the menu, unfreezes the screen, and returns macro control to the calling, or parent, routine.

**{UP}** moves the pointer up one cell to highlight the preceding menu option.

The *main* routine then continues as follows:

**{RECALC test}{IF test}{WINDOWSOFF}{BRANCH find}** recalculates the formula in *test*. That formula determines whether the keystroke recorded in *t* has a Lotus International Character Set code between 47 and 91. This range of code numbers includes all the alphanumeric characters. So if you press any letter or number, the macro freezes the screen and passes control to the *find* subroutine.

Here's what the *find* subroutine does:

The string formula in cell G22 returns different labels, depending on the menu range identified in *using*. The macro moves the cell pointer to the first cell of that menu range. It then controls a FOR loop, which is a macro subroutine that *1-2-3* processes for a predetermined number of times. In this case, the value in *rws* determines the number of times the macro will run the *find2* routine.

The loop starts by placing the second argument of the {FOR} command in the cell named in the first argument. So initially, the macro enters the value 1 in *ct*. With each iteration of *find2*, the macro increases the value in *ct* by the value in the fourth argument of the command. In this case, each loop increases the value in *ct* by 1. When the value in *ct* exceeds the value in the third argument, *rws*, the macro stops calling *find2*. Thus, the macro processes the *find2* routine one time for each of the rows in the current menu range. After the FOR loop is complete, the macro unfreezes the screen and passes control back to the start of the *main* routine.

The *find2* routine locates the menu option that best corresponds to your alphanumeric keystroke. Here's how it works:

**{IF @LEFT(@CELLPOINTER("contents"),1)>=@UPPER(t)}{FORBREAK}** determines whether the current cell starts with a character that is greater than or equal to the character in *t*. If the current cell meets this condition, the macro halts the FOR loop.

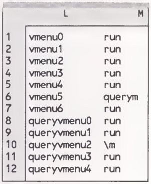
**{IF pl=rws−1}{WINDOWSOFF}{UP rws−1}{WINDOWSON}{RETURN}** determines whether the value in *pl* equals one less than the value in *rws*. If it does, the macro freezes the screen. Then it moves the pointer up by one less than the value in *rws* and unfreezes the screen. Finally, the macro returns control to the calling routine.

{DOWN} moves the pointer down one cell.

The last line of the *main* routine, {downp}{BRANCH main}, calls the *downp* routine and then loops control to the start of the *main* routine. We just explained the *downp* routine as part of the *find2* routine.

## CREATE YOUR OWN MENUS

The design of this menu system favors simplicity over speed, but you'll find that it's fast enough for most applications. It's easy to adapt this macro for your own applications. You can alter these menus by entering your own menu prompts as labels in ranges *vmenu* and *queryvmenu*. Then all you have to do is alter the entries in column M of *ltable* (see figure 4) in order to call any desired macro routine.



| | L | M |
|---|---|---|
| 1 | vmenu0 | run |
| 2 | vmenu1 | run |
| 3 | vmenu2 | run |
| 4 | vmenu3 | run |
| 5 | vmenu4 | run |
| 6 | vmenu5 | querym |
| 7 | vmenu6 | run |
| 8 | queryvmenu0 | run |
| 9 | queryvmenu1 | run |
| 10 | queryvmenu2 | \m |
| 11 | queryvmenu3 | run |
| 12 | queryvmenu4 | run |

**FIGURE 4**

If you want to add a new menu screen, you need to complete four tasks:

1. Create a screen for the menu, and set up the menu with the items in alphabetical order.

2. Assign a unique range name to the menu items.

3. Add entries to the *ltable* range. There should be one addition for each new menu option. Put the identifying label in column L and the name of the macro routine in column M. The identifying label in column L must consist of the range name of the new menu options concatenated with the numeral that identifies the option's offset in the

### HOW TO SET UP THE WORKSHEET FOR A CENTER-SCREEN LIGHT-BAR MENU

**1. Default settings**

**Column width:** 13

/Worksheet Global Column-Width, enter 13

**2. Individual column widths**

| Column | Width |
|---|---|
| C | 20 |
| F | 7 |

For example, to set the width of column C, place the cell pointer in column C, select /Worksheet Column Set-Width, enter 20.

**3. Labels**

Enter all labels shown in the figures. Omit, for now, items printed in red. To create a row of double dashes, enter \=. To create a row of dashes, enter \–. Center the labels in cells C6. and C26: Select /Range Label Center, specify the cell address, and press Return.

If you're working with *1-2-3* Release 2.2 or 3, replace the entry in cell G9 with {BORDERSOFF}{PANELOFF clear}{HOME}{GOTO}vmenu~. This will erase the borders and control panel from the screen when you run the macro and will give your screen a professional, customized look.

**4. Range names**

| Name | Range |
|---|---|
| *queryvmenu* | C28..C32 |
| *vmenu* | C8..C14 |
| *ltable* | L1..M12 |
| *rws* | G1 |
| *pl* | G2 |
| *test* | G3 |
| *upit* | G4 |
| *using* | G5 |
| *start* | G6 |
| *t* | G7 |
| *ct* | G8 |
| *\m* | G9 |
| *main* | G12 |
| *upp* | G19 |
| *find* | G22 |
| *find2* | G23 |
| *downp* | G24 |
| *select* | G27 |
| *run* | G29 |
| *querym* | G31 |

To assign the first three range names, select /Range Name Create, enter the name, and indicate the range. To assign the remaining range names, position the cell pointer in cell F1, select /Range Name Labels Right, and indicate range F1..F31.

**5. Enter and copy formulas**

| Cell | Formula |
|---|---|
| **G1** | '@ROWS(@@(using)) |
| **G2** | @CELLPOINTER("row")−start |
| **G3** | 47<@CODE(@LEFT(@UPPER(t),1))#AND#91>@CODE(@LEFT(@UPPER(t),1)) |
| **G4** | +t="{UP}"#OR#t="{LEFT}"#OR#t="{BACKSPACE}" |
| **G22** | +"{GOTO}"&using&"~{FOR ct,1,rws,1,find2}{WINDOWSON}{BRANCH main}" |

menu. For example, the label *vmenu0* identifies the first item in the *vmenu* range.

4. Write a macro routine similar to the *querym* routine. The routine must position the menu on the screen and move the cell pointer to the first menu option. Then the macro must enter the current row number in *start* and the name of the menu range in *using*. The macro then must recalculate the worksheet and pass control to *main*.

## MACRO LETTERS

### ROUNDING TO THE NEAREST QUARTER

I've been trying to write a macro that will round a number to the nearest quarter. For example, the macro should round 0.11 to 0.00, 0.21 to 0.25, and 0.77 to 0.75. I have hundreds of such numbers and would appreciate a macro that makes my job easier.

*Frank McDonald*
*Laguna Hills, Calif.*

**The editor replies:** In this situation, a formula is the best choice. For any number located in cell B1, the formula @ROUND(B1/0.25,0)*0.25 returns that number rounded to the nearest quarter.

### ROUNDING TO THE NEAREST HUNDRED

I do long-range budgeting and planning. I need a macro that will round estimated figures to the nearest 100. For example, the macro should round a value of 69,960.25 to 70,000. How can I do this?

*Fawzi F Hajjar*
*Beirut University College*
*Beirut, Lebanon*

**The editor replies:** The @ROUND function, not a macro, does the job nicely. The function takes two arguments: a value and a value indicating the number of decimal places, ranging from −15 to 15, inclusive. To round to the nearest 100, specify −2 as the decimal-place argument. Using your example, @ROUND(69960.25,−2) returns 70000.

### PASSWORD PROTECTION IN 1-2-3 RELEASE 2

I would like to create a *1-2-3* Release 2 macro that emulates the password capabilities of *1-2-3* Release 2.01. I've tried writing several autoexecuting routines, but none of them work satisfactorily. What do you recommend?

*Andrew J. Bracken*
*Storer Cable Communications*
*North Charleston, S.C.*

**The editor replies:** *1-2-3* Release 2 has a built-in password-protection feature. To assign a password to a file, you press slash, select File Save, enter a file name followed by a space and the letter P, and enter your password. Then verify the password when you are prompted. Now the file is password-protected.

When you try to retrieve the file, *1-2-3* prompts you to enter the password. Don't forget it because without it, you won't be able to retrieve the file. Also, because the password is case-sensitive, you must reproduce it exactly to retrieve your file.

### TAMING AUTOEXEC MACROS DURING DEBUG

When debugging an autoexecuting macro named \0, I usually need to retrieve the worksheet over and over again. Sometimes I wish only to edit the worksheet and not have the autoexecuting macro run. Rather than trying to press Control-Break before the macro starts, I initiate Step mode before I retrieve the worksheet. When I retrieve the file, the macro pauses so that I can press Control-Break to stop it. I then disable Step mode and can edit the worksheet.

*Laurence Wallman*
*Overland Park, Kans*

**The editor replies:** Even in Step mode, *1-2-3* will process the first command of an autoexecuting macro. If that first command happens to be {BREAKOFF}, Step mode doesn't help you at all. We suggest that you refrain from naming the macro \0 until you've finished debugging your worksheet. Name the macro *m* and run it manually during development.

### MACROS THAT CALL 1-2-3 ADD-INS

Can a macro call a *1-2-3* add-in? I can't find {ALT} on the list of special keywords in my reference manual. Using {ALT}{QUERY} results in an error message.

*George G. Paine*
*Sylvania Coil Operations*
*Waldoboro, Maine*

**The editor replies:** After you install the Add-In Manager, which comes with the Lotus *1-2-3* Value Pack, you have two new @functions and four new macro keywords at your disposal:

@ISAPP("*add-in name*") checks to see if the specified add-in is attached. For example, @ISAPP("allways") returns 1 if you have ALLWAYS.ADN attached and 0 if you don't.

@ISAAF("*add-in @function*") checks to see if the specified add-in @function is attached. For example, if you have an add-in that has an @STOP function, @ISAAF ("stop") returns 1 if it's attached and 0 if it isn't.

A macro can invoke the Add-In Manager with the command keyword {APP4}, which is the equivalent of holding down the Alt key and pressing the F10 key. Likewise, {APP1} is equivalent to Alt-F7. It can invoke an add-in that you assigned to the F7 key. {APP2} corresponds to Alt-F8, and {APP3} corresponds to Alt-F9. ■

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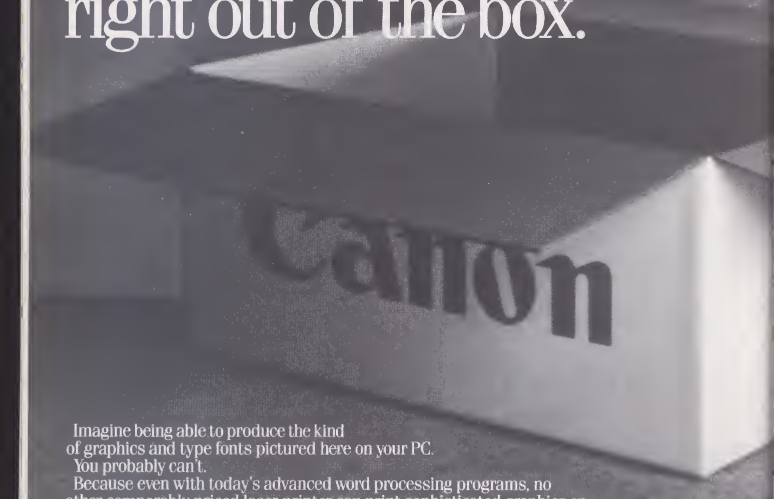

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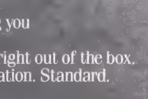

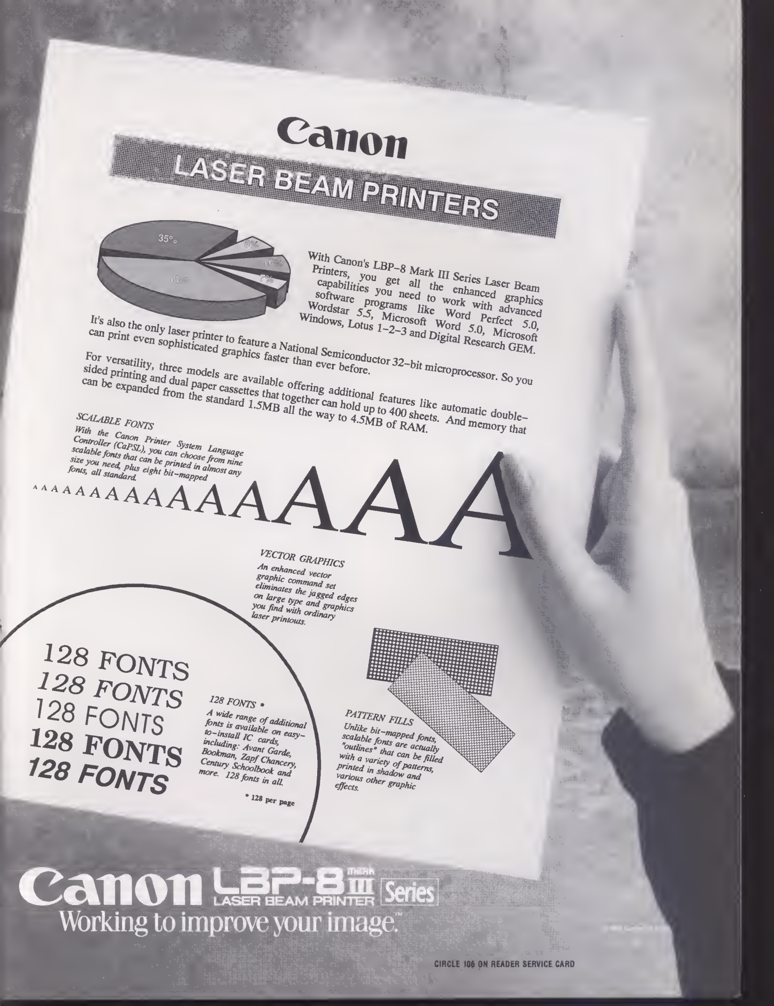

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FOR DEVELOPERS

# CREATE FORM-FILLING INPUT ROUTINES

**Learn effective screen design for models that require repetitive data entry.**

BY NICK DELONAS

There are two basic types of screen-user dialogues: question and answers, and fill in the blanks. Effective use of these screens makes all the difference in how well people respond to your models. In the August issue we discussed routines that are useful in conducting Q&As. Here we'll talk about fill-in-the-blanks data-entry screens.

Strict Q&A routines are useful in models that many people will use. Fill-in-the-blanks routines, on the other hand, are well suited to people who do repetitive data entry.

As with Q&A, the key to form-filling routines is to set up the screen so that it makes sense. If, for example, someone will be entering sales orders, then your screen should resemble a sales-order form. If you are replacing a manual invoicing system, your screen should resemble a printed invoice.

## CREATING A SCREEN FORM

It's easy to set up a fill-in-the-blanks form in *1-2-3*. Writing an input routine can also be simple. You can, for example, create a screen form, remove protection from all cells involved in data entry, and then write a macro that issues a Range Input command. The Range Input command limits the movement of the cell pointer to unprotected cells in a specified range—in this case, the range of the blanks on the entry form.

This approach is simple and may be just fine under certain circumstances. However, the less work your macro does, the more work the keyboarder does.

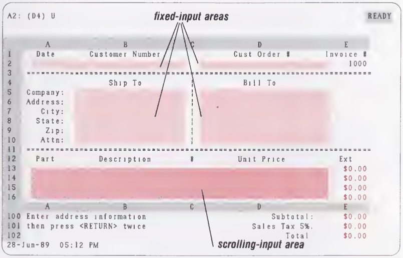
For example, imagine a sales-order input routine that simply issues a Range Input command for a specified range. A keyboarder must enter the customer's name and address even if a database of customer addresses is available. A keyboarder has to enter part codes, descriptions, and prices even if there's a database of parts available. A macro that also accessed these databases would speed data entry and reduce entry errors.

Long forms can also present some difficulties. They require more data-entry space than is available on monitors. You can handle this problem by setting up a screen that scrolls through a long form or by creating separate screens for different parts of the form.

Consider the screen form in figure 1. This screen simulates an invoice. A keyboarder would immediately see where to enter information. The areas at the top, labeled "fixed-input areas" in the figure, receive information that remains visible during the entire order-entry process. The area in the middle, labeled the "scrolling-input area," is where the keyboarder enters the list of parts or items the customer orders. This area scrolls if the list includes more than four items. The total price, which you can find in the lower-right corner, remains visible as the list scrolls.

One way you could create this screen format would be to split the screen by using the Worksheet Windows Horizontal command. Then you would fix the top portion of the screen by using the Worksheet Titles Horizontal command. Then, as suggested earlier, you would write a macro that would incorporate the Range Input command.

Or you might think that, instead of using the Range Input command, you could improve such a model by using {GETLABEL} commands that prompt the user for each entry. But there is a better way, as you will see in a moment.



```
A2: (D4) U                                                    READY

        A              B              C          D              E
1      Date     Customer Number              Cust Order #    Invoice #
2                                                                 1000
3   ==================================================================
4                    Ship To                      Bill To
5   Company:
6   Address:
7      City:
8     State:
9       Zip:
10     Attn:
11  ==================================================================
12     Part        Description        #        Unit Price         Ext
13                                                               $0.00
14                                                               $0.00
15                                                               $0.00
16                                                               $0.00
        A              B              C          D              E
100 Enter address information                  Subtotal:       $0.00
101 then press <RETURN> twice               Sales Tax 5%.      $0.00
102                                                 Total      $0.00
28-Jun-89  05:12 PM
```

**FIGURE 1**

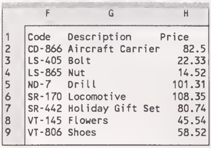
## MONITORING INDIVIDUAL KEYSTROKES

While the Range Input and {GETLABEL} commands are useful, they both have a significant drawback: They don't let your macro monitor individual keystrokes. If a user repeatedly presses the Escape key hoping to backtrack from the data-entry routine, your macro may not be able to react immediately. Pressing Escape when the Range Input command is processing has the same effect as pressing the Return key without starting an entry or cell edit. That is, control passes from the Range Input command to the next macro instruction. Pressing Escape when prompted by a {GETLABEL} command simply enters a null string in the target cell. Macro processing proceeds, since the macro does not know that the user wants to back up.

You can lessen this problem by having your macros check for data-entry errors. But there are distinct advantages to being able to respond to specific keys. For example, your macro might respond to the question mark key by providing instantaneous on-line help. Or it could respond to the plus key by presenting a list of possible entries, such as product codes or customer numbers.

Figure 2 contains a database of parts that a macro could access to help fill in an invoice form.

Here the database lists the code, or number, for each part in column F, the description in column G, and the price per part in column H. If you want to make data entry easier, your macro could look up the part number the user enters and then fill in the corresponding description and price. To accomplish this, the macro must at least be able to monitor cell entries. However, monitoring each keystroke opens up even more possibilities.



```
        F        G                     H

1    Code    Description          Price
2    CD-866  Aircraft Carrier       82.5
3    LS-405  Bolt                  22.33
4    LS-865  Nut                   14.52
5    ND-7    Drill                101.31
6    SR-170  Locomotive           108.35
7    SR-442  Holiday Gift Set      80.74
8    VT-145  Flowers               45.54
9    VT-806  Shoes                 58.52
```

**FIGURE 2**

To see how a macro can monitor individual keystrokes and to demonstrate the scrolling described earlier, build our simple model. Make sure you're using *1-2-3* Release 2.01 or a later release. The model will not work properly in earlier releases.

First set the widths of the columns in a blank worksheet as follows: B–24, C–4, D–24, E–11, F–7, and G–16.

Enter all labels and values as shown in the previous two figures. Enter \= in cell A3 and copy cell A3 to ranges B3..E3 and A11..E11. Enter ’¦ in cell C4 and copy cell C4 to range C5..C10. Omit entries printed in red, because that text results from formulas we'll enter later. Use the Range Label Center command to center labels in ranges A1..E1, B4..D10, and A12..E12. Use the Range Label Right command to right-justify labels in ranges A5..A10 and D100..D102.

Now enter the macro shown in figure 3 on the next page.

Enter all labels as shown. Again, omit text printed in red. Use the Range Name Labels Right command to assign the labels in column F as range names for the adjacent cells in column G. Use the Range Name Create command to assign the following range names:

| **Name** | **Range** | **Name** | **Range** |
|---|---|---|---|
| *message* | A100 | *customer* | B2..D2 |
| *ent* | A13 | *address1* | B5..B10 |
| *items* | A13..D99 | *address2* | D5..D10 |
| *address* | A1..E11 | *invoicex* | E2 |
| *datex* | A2 | *pt* | F1..H9 |

Enter the formula +D13*C13 in cell E13 and then copy it to range E14..E97. Then enter the following formulas:

| **Cell** | **Formula** |
|---|---|
| **E100** | @SUM(E13..E97) |
| **E101** | +E100*0.05 |
| **E102** | +E100+E101 |
| **G19** | +“{RECALC p}{GOTO}A”&@STRING (@CELLPOINTER(“row”),0)&“~” |
| **G39** | +“{RECALC fln2}{LET ”&@CELLPOINTER (“address”)&“,t}” |
| **G48** | +“{LET t,”““”&@STRING(t,0)&“””“}” |
| **G49** | +“{LET t,”““”&@STRING(@CELLPOINTER (“contents”),0)&t&“””“}” |

Select /Range Unprotect and specify ranges A2..E2, B5..B10, and D5..D10. Assign the Date 4 format for cell A2 and the Currency 2 format for range D13..E102.

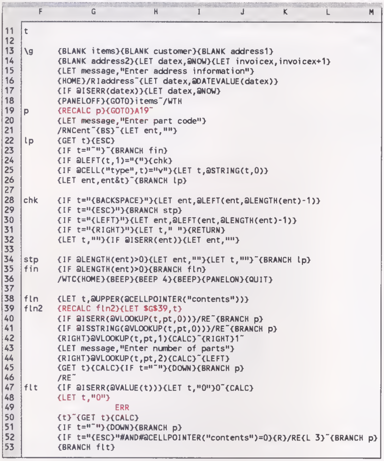
Finally, move the cell pointer to cell A17 and select /Worksheet Window Horizontal. Press the WINDOW key, press the GOTO key, and enter A100. Press the WINDOW key again. Move the cell pointer to cell A2. Your screen should look like the screen form in the figure. The cell pointer should be in the top window.

To run the macro, hold down the MACRO key (Alt on most computers) and press G. Enter the customer address in the screen form. If you press Return without making an entry, or if you press the Escape key, the macro will position the pointer in cell A13. Enter any valid part code. The macro fills in the part description and price. Enter the number of parts you want ordered or press the Return key to accept the default number of 1.

The macro then moves the cell pointer down a line and waits for the next part code. If you enter a spurious number, the macro erases it and waits for a valid code. The macro sets to 0 any nonnumeric entry for the number of parts in column C.

In the *p* routine, which handles the input of the part code, the macro accepts one keystroke at a time. It enters each character you type, in turn, in the current cell. Experiment by pressing the Arrow keys, the function keys, and the Escape key to see how the macro handles your entries.

You'll notice that the Escape key erases everything you've entered in the current cell. This is a response writ-



```
       F         G              H            I           J           K           L            M
11 t
12
13 \g      {BLANK items}{BLANK customer}{BLANK address1}
14         {BLANK address2}{LET datex,@NOW}{LET invoicex,invoicex+1}
15         {LET message,"Enter address information"}
16         {HOME}/RIaddress~{LET datex,@DATEVALUE(datex)}
17         {IF @ISERR(datex)}{LET datex,@NOW}
18         {PANELOFF}{GOTO}items~/WTH
19 p       {RECALC p}{GOTO}A19~
20         {LET message,"Enter part code"}
21         /RNCent~{BS}~{LET ent,""}
22 lp      {GET t}{ESC}
23         {IF t="~"}~{BRANCH fin}
24         {IF @LEFT(t,1)="{"}{chk}
25         {IF @CELL("type",t)="v"}{LET t,@STRING(t,0)}
26         {LET ent,ent&t}~{BRANCH lp}
27
28 chk     {IF t="{BACKSPACE}"}{LET ent,@LEFT(ent,@LENGTH(ent)-1)}
29         {IF t="{ESC}"}{BRANCH stp}
30         {IF t="{LEFT}"}{LET ent,@LEFT(ent,@LENGTH(ent)-1)}
31         {IF t="{RIGHT}"}{LET t," "}{RETURN}
32         {LET t,""}{IF @ISERR(ent)}{LET ent,""}
33
34 stp     {IF @LENGTH(ent)>0}{LET ent,""}{LET t,""}~{BRANCH lp}
35 fin     {IF @LENGTH(ent)>0}{BRANCH fln}
36         /WTC{HOME}{BEEP}{BEEP 4}{BEEP}{PANELON}{QUIT}
37
38 fln     {LET t,@UPPER(@CELLPOINTER("contents"))}
39 fln2    {RECALC fln2}{LET $G$39,t}
40         {IF @ISERR(@VLOOKUP(t,pt,0))}/RE~{BRANCH p}
41         {IF @ISSTRING(@VLOOKUP(t,pt,0))}/RE~{BRANCH p}
42         {RIGHT}@VLOOKUP(t,pt,1){CALC}~{RIGHT}1~
43         {LET message,"Enter number of parts"}
44         {RIGHT}@VLOOKUP(t,pt,2){CALC}~{LEFT}
45         {GET t}{CALC}{IF t="~"}{DOWN}{BRANCH p}
46         /RE~
47 flt     {IF @ISERR(@VALUE(t))}{LET t,"0"}0~{CALC}
48         {LET t,"0"}
49                     ERR
50         {t}~{GET t}{CALC}
51         {IF t="~"}{DOWN}{BRANCH p}
52         {IF t="{ESC}"#AND#@CELLPOINTER("contents")=0}{R}/RE{L 3}~{BRANCH p}
53         {BRANCH flt}
```

FIGURE 3

ten into the macro. This response is in contrast to that caused by pressing the Escape key when the Range Input command of the \g routine is in effect. If you haven't entered anything, pressing Escape ends macro processing. The macro ignores function keys, as well as the UpArrow and DownArrow keys. The LeftArrow and RightArrow keys work as expected, as does the Backspace key.

Here's how it all works:

**{BLANK items}{BLANK customer}{BLANK address1}** erases entries from ranges *items*, *customer*, and *address1*.

**{BLANK address2}{LET datex,@NOW}{LET invoicex, invoicex+1}** erases entries from *address2* and enters the current serial date value in *datex*. The macro then increases the value in *invoicex* by 1.

**{LET message,"Enter address information"}** enters the label *Enter address information* in *message* (cell A100).

**{HOME}/RIaddress~{LET datex,@DATEVALUE (datex)}** moves the cell pointer to cell A1 and issues a Range Input command for the range *address*. This line of code illustrates the traditional form-filling technique in *1-2-3*. The Range Input command suspends macro processing while you enter items into the unprotected cells of the *address* range. You end the Range Input command by pressing the Return key without first making or editing an entry (when *1-2-3* is in Ready mode). After the Range Input command releases control, the macro uses the @DATEVALUE formula to update the contents of *datex*. If you enter a date as either a string or an @DATE formula, the @DATEVALUE formula returns the serial date value of that entry. The date string must be in one of the five *1-2-3* date formats. The five valid date strings for October 1 of this year are: "01-Oct-89," "01-Oct," "Oct-89," "10/01/89," and "10/01."

**{IF @ISERR(datex)}{LET datex,@NOW}** enters the current serial date in *datex* if *datex* contains ERR. ERR in *datex* is the result of the @DATEVALUE formula of the previous line evaluating an unrecognized date string.

**{PANELOFF}{GOTO}items~/WTH** freezes the control panel, moves the cell pointer to *items*, and issues a Worksheet Titles Horizontal command. This freezes range A1..E12 along the top of the screen. As you enter information in the range A13..D99, the screen between this area and the lower window scrolls.

The string formula in cell G19 recalculates itself and then moves the cell pointer to column A of the current row.

**{LET message,"Enter part code"}** enters the label *Enter part code* in *message*.

**/RNCent~{BS}~{LET ent,""}** names the current cell *ent* and enters a null string there.

**{GET t}{ESC}** pauses for user input, enters a single keystroke in *t*, and presses Escape.

**{IF t="~"}~{BRANCH fin}** passes macro control to *fin* (see next page) if *t* contains a tilde (~). This means that control goes to *fin* when you press the Return key to finish an entry.

**{IF @LEFT(t,1)="{"}{chk}** calls the *chk* subroutine (see below) if the first character in *t* is a left brace, signifying the beginning of a macro keyword.

**{IF @CELL("type",t)="v"}{LET t,@STRING(t,0)}** changes the entry in *t* to a string with zero decimal places if *t* contains a value.

**{LET ent,ent&t}~{BRANCH lp}** concatenates the label in *ent* with *t* and enters the resulting string in *ent*. So the macro adds the character you just typed to the end of the string in the current cell (*ent*). The macro then presses the Return key to update the screen and loops control to the *lp* routine.

## THE CHK SUBROUTINE

The *chk* subroutine examines the contents of *t* for specific macro keywords. These tests are done separately from the *p* routine to speed processing time. The macro calls the *chk* routine only if the first character in *t* is a left brace. So *p* only needs to make one test on each iteration instead of four. You can expand this routine to check for any function-key press. This macro could thus activate an on-line help routine. Another possibility is to assign specific part codes to particular function keys and have the macro fill in the number when the user presses the corresponding key.

**{IF t="{BACKSPACE}"}{LET ent,@LEFT(ent, @LENGTH(ent)−1)}** trims the last character from the label in *ent* if *t* contains the label *{BACKSPACE}*.

**{IF t="{ESC}"}{BRANCH stp}** passes macro control to *stp* (see below) if *t* contains the label *{ESC}*.

**{IF t="{LEFT}"}{LET ent,@LEFT(ent,@LENGTH(ent) −1)}** trims the last character from the label in *ent* if *t* contains the label *{LEFT}*.

**{IF t="{RIGHT}"}{LET t," "}{RETURN}** enters a space character in *t* if *t* contains the label *{RIGHT}*. Under such circumstances, the macro would then return control to the calling, or parent, routine.

**{LET t,""}{IF @ISERR(ent)}{LET ent,""}** enters a null string in *t*. The macro then determines whether the current cell (*ent*) contains ERR. If it does, the macro enters a null string in the current cell.

## THE STP AND FIN ROUTINES

The *stp* and *fin* routines either loop macro control back to the top of a calling routine or stop macro processing. The *stp* routine runs when you press the Escape key when entering a part number. The *fin* routine runs when you press the Return key without entering a product code or after you've finished entering a code.

**{IF @LENGTH(ent)>0}{LET ent,""}{LET t,""}~{BRANCH lp}** enters null strings in *ent* and *t* and then passes macro control to *lp* if *ent* contains an entry.

**{IF @LENGTH(ent)>0}{BRANCH fln}** passes control to *fln* if *ent* contains an entry.

**/WTC{HOME}{BEEP}{BEEP 4}{BEEP}{PANELON}{QUIT}** issues the Worksheet Titles Clear command, moves the pointer to cell A1, sounds three beeps, and then frees up the control panel. The macro then stops.

## THE FLN AND FLT ROUTINES

The *fln* routine looks up the code you've entered in the parts database. If the code doesn't exist, the macro erases the current cell and control branches back to *p*. Otherwise, the macro fills in all the part information and pauses for the user to indicate the quantity of parts to order (the *flt* routine). The *flt* routine is similar to the *lp* routine, though not as thorough in its keystroke monitoring.

**{LET t,@UPPER(@CELLPOINTER("contents"))}** resets all characters in the current cell to uppercase and copies the resulting string to *t*.

The string formula in cell G39 recalculates itself and then enters the revised entry in the current cell.

**{IF @ISERR(@VLOOKUP(t,pt,0))}/RE~{BRANCH p}** erases the current cell and passes control to *p* if the macro can't find the code entered in *t* in the *pt* data table. This line of code, as well as the next, erases an invalid part number and lets you reenter the number.

**{IF @ISSTRING(@VLOOKUP(t,pt,0))}/RE~{BRANCH p}** erases the current cell and passes control to *p* if the code entered in *t* is numeric. No part codes are numeric, so all numeric entries are invalid. The @VLOOKUP formula returns the label *VT-806*, the last part code, for any numeric entry. Since this is a string, and since @VLOOKUP returns a value for a valid code entry, the macro can determine that the entry is incorrect.

**{RIGHT}@VLOOKUP(t,pt,1){CALC}~{RIGHT}1~** moves the cell pointer to the right and enters the corresponding part description. The macro moves the cell pointer to the right once again and enters the default quantity of 1.

**{LET message,"Enter number of parts"}** enters the label *Enter number of parts* in *message*.

**{RIGHT}@VLOOKUP(t,pt,2){CALC}~{LEFT}** moves the pointer to the right and enters the corresponding part price. The macro then moves the pointer to the left and highlights the quantity entry.

**{GET t}{CALC}{IF t="~"}{DOWN}{BRANCH p}** pauses for user entry and stores the keystroke in *t*. The macro then recalculates the worksheet. If *t* contains a tilde, the macro moves the pointer down and passes control to the *p* routine.

**/RE~** erases the contents of the current cell.

**{IF @ISERR(@VALUE(t))}{LET t,"0"}0~{CALC}** enters the label 0 in *t* and the value 0 in the current cell if *t* contains a nonnumeric string.

The string formula in cell G48 changes the value in *t* to a string with zero decimal places. The string formula in cell G49 then concatenates the string form of the value in the current cell with the label in *t* and enters the resulting string in *t*.

**{t}~{GET t}{CALC}** calls *t* as a subroutine. The string in *t* is effectively translated into a value and entered in the current cell. The macro pauses for your next keystroke and enters that keystroke in *t*. The macro then recalculates the worksheet.

**{IF t="~"}{DOWN}{BRANCH p}** moves the cell pointer down and passes control to *p* if *t* contains a tilde.

**{IF t="{ESC}"#AND#@CELLPOINTER("contents") =0}{R}/RE{L 3}~{BRANCH p}** determines if *t* contains the label *{ESC}* and if the value in the current cell is 0. If both conditions are true, the macro erases the current part information and passes control to the *p* routine.

**{BRANCH flt}** loops control back to subroutine *flt*.

## CREATING YOUR OWN MODELS

For the sake of brevity, we created a model that merely illustrates a few techniques. In a finished model, your data-input routine could fill in customer address information after a keyboarder entered a customer number. It could also include more rigorous error-checking procedures throughout.

If you use *1-2-3* Releases 2.2 or 3.0, you might want to append the {BORDERSOFF} command to the end of the label in cell G13 and change the {PANELOFF} command in cell G18 to {PANELOFF clear}. This will erase the borders and the information in the control panel while the user enters part codes. ■

# WHEN TO GET IN, WHEN TO GET OUT.

## You can time your investments to stay one step ahead of the market.

BY WARD L. FRIDRICH

Ever since the stock market crash of October 1987, there has been a lot of press about the use of computers by big investment firms to trigger purchases and sales of stocks. Even today, two years after the crash, the role of computers in stock transactions is controversial. Can a computer be programmed to provide reliable buying and selling advice? Many say no. The subtleties of market behavior preclude any attempt to model it using a machine. Others aren't so sure.

If you feel that computers *can* model the behavior of investment markets, you may find this article interesting. It describes a worksheet that helps you predict optimum investment timing by using statistical analysis and your own common sense. There is no guarantee that it will work for you. No method for predicting the movement of a financial market is 100% infallible. Yet the model has worked in the past. If you had invested in the Dreyfus Growth Opportunity Fund, a popular mutual fund, in January 1987 and had held on to it through December 1988, you would have realized about a 12% average annual return on your investment. I invested in this fund, but moved the investment back and forth between the fund and a money market account during the same period, as indicated by the worksheet. I experienced a 19.7% return on investment. This required twelve trades during the two years, an average of one trade per two months. It's worth noting that the week before the October 1987 crash, the worksheet issued a signal to sell.

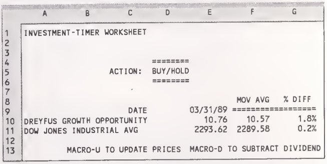
### TRACKING A MOVING AVERAGE

The key to the technique is to track the moving average of the price of the instrument you're interested in. A moving average is the average of the price for the current week and for a set number of previous weeks. For example, the 10-week moving average for a mutual fund is the average of prices from the most recent 10 weeks, taken at regular intervals, such as every Friday. Unlike a running average, which is the average of all prices from a fixed starting date to the present, a moving average drops the oldest price before adding the newest.

People who deal in instruments such as bonds or futures typically tell their brokers to get them out of an investment when its price crosses a predetermined threshold called a stop-loss line. The moving average is like a moving stop-loss line. If the moving average goes below the most recent price of the instrument, you sell out to avoid losing too much of your investment. Conversely, if the moving average goes above the current price, it's time to reinvest.

This strategy works best with an investment that follows the general trends of its market. In our sample worksheet, we track the performances of the Dreyfus Growth Opportunity Fund, which we'll refer to as the Fund, and the Dow Jones industrial average. We use the Dow as a confirming indicator to minimize the chance of getting false sell signals. Other growth mutual funds and blue-chip stocks will work in the worksheet. If you use a similar worksheet for bonds, you should use a different confirming indicator, such as the Dow Jones bond average.

Furthermore, if you have a choice, you should select an investment that doesn't impose commissions or penalties when you buy or sell. Such charges offset any profits you'll realize by using this strategy. Some mutual funds allow you to make trades without charge, but if you choose this type of fund, make sure that it does not limit



```
        A        B        C        D        E        F        G
 1  INVESTMENT-TIMER WORKSHEET
 2
 3
 4                                 ========
 5                        ACTION:  BUY/HOLD
 6                                 ========
 7
 8                                                  MOV AVG   % DIFF
 9                           DATE          03/31/89 =================
10  DREYFUS GROWTH OPPORTUNITY                10.76    10.57     1.8%
11  DOW JONES INDUSTRIAL AVG                2293.62  2289.58     0.2%
12
13          MACRO-U TO UPDATE PRICES  MACRO-D TO SUBTRACT DIVIDEND
```

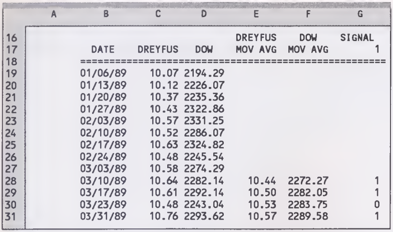
**FIGURE 1. This section of the worksheet contains the most recent price of your investment (cell E10), the most recent level for the confirming indicator (in this case, the Dow Jones industrial average, cell E11), the most recent moving averages for your investment and the indicator (cells F10 and F11), and the signal formula (cell D5), which indicates whether your money should be in the instrument you are monitoring or in an interest-bearing account.**

---

*Ward L. Fridrich is the president of Chuckanut Financial Software in Bellingham, Wash.*

# COVER STORY

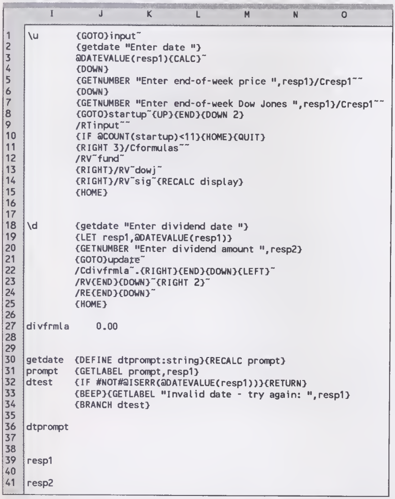
KAT THACKER



```
        A         B          C        D         E          F         G

16                                          DREYFUS     DOW     SIGNAL
17                DATE    DREYFUS   DOW     MOV AVG   MOV AVG        1
18             ==================================================
19             01/06/89     10.07 2194.29
20             01/13/89     10.12 2226.07
21             01/20/89     10.37 2235.36
22             01/27/89     10.43 2322.86
23             02/03/89     10.57 2331.25
24             02/10/89     10.52 2286.07
25             02/17/89     10.63 2324.82
26             02/24/89     10.48 2245.54
27             03/03/89     10.58 2274.29
28             03/10/89     10.64 2282.14     10.44  2272.27         1
29             03/17/89     10.61 2292.14     10.50  2282.05         1
30             03/23/89     10.48 2243.04     10.53  2283.75         0
31             03/31/89     10.76 2293.62     10.57  2289.58         1
```

**FIGURE 2. You add data to this table each week, entering the date, the price of the instrument you wish to invest in, and the Dow Jones industrial average, as prompted by the macro. You enter the formulas in range E28..G28 when you set up the worksheet. Once there are 10 sets of values in the table, the macro copies the formulas to the row that has the most recent set of entries.**



```
        I         J         K         L         M         N         O

1   \u        {GOTO}input~
2             {getdate "Enter date "}
3             @DATEVALUE(resp1){CALC}~
4             {DOWN}
5             {GETNUMBER "Enter end-of-week price ",resp1}/Cresp1~~
6             {DOWN}
7             {GETNUMBER "Enter end-of-week Dow Jones ",resp1}/Cresp1~~
8             {GOTO}startup~{UP}{END}{DOWN 2}
9             /RTinput~~
10            {IF @COUNT(startup)<11}{HOME}{QUIT}
11            {RIGHT 3}/Cformulas~~
12            /RV~fund~
13            {RIGHT}/RV~dowj~
14            {RIGHT}/RV~sig~{RECALC display}
15            {HOME}
16
17
18  \d        {getdate "Enter dividend date "}
19            {LET resp1,@DATEVALUE(resp1)}
20            {GETNUMBER "Enter dividend amount ",resp2}
21            {GOTO}update~
22            /Cdivfrmla~.{RIGHT}{END}{DOWN}{LEFT}~
23            /RV{END}{DOWN}~{RIGHT 2}~
24            /RE{END}{DOWN}~
25            {HOME}
26
27  divfrmla      0.00
28
29
30  getdate   {DEFINE dtprompt:string}{RECALC prompt}
31  prompt    {GETLABEL prompt,resp1}
32  dtest     {IF #NOT#@ISERR(@DATEVALUE(resp1))}{RETURN}
33            {BEEP}{GETLABEL "Invalid date - try again: ",resp1}
34            {BRANCH dtest}
35
36  dtprompt
37
38
39  resp1
40
41  resp2
```

**FIGURE 3. The macro in range J1..J15 guides you as you enter weekly investment information. The macro in range J18..J25 adjusts the table of prices (see figure 2) to allow for dividends paid by your investment. Cell J27 contains a formula that the *\d* macro copies into the area next to the table. Both macros call the subroutine *getdate*, range J30..J34, which insures that the dates you enter are valid. This routine places the message that's passed to it in cell J36 and uses this message when prompting you for a date. Finally, cells J39 and J41 hold your responses to the various prompts in the macros.**

the number of trades you can make in a year.

Figure 1 shows the upper area of the investment-timer worksheet. Several weeks' worth of Fund prices and Dow averages have been entered, producing the results shown. The most recent date and values appear in range E9..E11. Cells F10 and F11 contain the most recent moving averages, and cells G10 and G11 show the percentages by which current amounts differ from the moving averages. Positive values indicate that the current values exceed the moving averages.

When you use the worksheet, you enter the Fund price and Dow average each week, as indicated in figure 2. The macro named *\u*, in rows 1 to 15 of figure 3, guides you through this process and also places your entries at the end of a table like the one in figure 2. Once the table has 10 weeks' worth of data, the macro copies the formulas you entered in row 28 that compute moving averages and a buy/sell signal to the same row as the newly entered date and prices.

Each signal formula in column G of figure 2 is a nested @IF formula that returns either 1 or 0. If the moving average for the fund is less than the current price of the fund and the moving average for the Dow is less than the current Dow, the formula returns 1 and disregards its second test. But if either or both of these conditions is not true, the formula proceeds to its second test. In this test, if the result of the previous signal formula, located in the cell directly above, is 1 and at least one of the conditions evaluated in the first test is true, the formula returns 1. Otherwise, the formula returns 0.

Every time the macro creates a new set of moving-average and signal formulas, it places the results of those formulas in cells F10, F11, and G17. The string-returning formula in cell D5 interprets the signal value in cell G17. If cell G17 contains a 1, cell D5 returns the message *BUY/HOLD*. This means that if you haven't yet purchased the instrument you're considering, buy it now; if you have bought it, hold on to it. If cell G17 contains a 0, cell D5 returns the message *WAIT/SELL*. This means that if you haven't yet purchased the instrument, don't do so now; if you have bought it, convert 100% of the investment into a money market account.

Build the model from the instructions on page 36. Then read the following paragraphs to find out how to enter weekly prices and how to account for the dividends your investment pays.

THE STRATEGY WORKS BEST WITH AN INVESTMENT THAT FOLLOWS THE GENERAL TRENDS OF ITS MARKET.

### TRACKING A FUND

To use the worksheet, hold down the MACRO key (Alt on most computers) and press U. The cell pointer moves to cell E9, and the control panel displays the prompt *Enter date*. Enter 3/3/89. The pointer moves down a cell, and the control panel displays *Enter end-of-week price*. Enter 10.58. The pointer moves down another cell, and the panel displays *Enter end-of-week Dow Jones*. Enter 2274.29. The macro then moves the cell pointer to cell B18, presses the UpArrow, End, and DownArrow keys to get the pointer to the next empty cell in column B, and copies the three values you just entered to the current row by using the Range Transpose command. Since there aren't 10 sets of values yet, the macro moves the cell pointer to cell A1 and ends.

Press MACRO-U again, and enter 3/10/89, 10.64, and 2282.14 at the prompts. This time the macro places the values at the end of the list, moves the pointer to column E, and copies the range named *formulas* to the current cell. In this case, *formulas* is copied to itself, which has the effect of calculating that range. Next, the macro copies the value of cell E28 to cell F10, moves the pointer to the right, copies the value of cell F28 to cell F11, moves the pointer to the right again, copies the value of cell G28 to cell G17, and moves the pointer back to cell A1. Now that there are 10 weeks of prices and Dow averages, a signal value appears in cell G17. Since this value is 1, cell D5 displays the message *BUY/HOLD*.

Run the macro again, entering 3/17/89, 10.61, and 2292.14 at the prompts. Notice that the macro creates a new set of formulas in columns E, F, and G of the table. Cell D5 continues to display *BUY/HOLD*. Rerun the macro, entering 3/23/89, 10.48, and 2243.04. (The stock market was closed on March 24, Good Friday.) This time, cell D5 displays *WAIT/SELL*. Run the macro once more, entering 3/31/89, 10.76, and 2293.62. Cell D5 changes back to *BUY/HOLD*.

Now assume that it's the beginning of 1989 and you're really using this template to track the Fund. At the beginning of January, you set up a money market account with a broker. Every Friday you get the closing Dow average and the price of the Fund. Over the weekend you retrieve the worksheet, press MACRO-U, enter the information as prompted, and then save the worksheet.

As of the entry for March 10, you have a 10-week moving average, and the message in cell D5 changes to *BUY/HOLD*. On Monday you call the broker and ask that the balance of the money market account be moved to the Fund. Two weeks later, when you make the entry for March 23, the message changes to *WAIT/SELL*. On Monday you ask the broker to convert the investment back to a money market account. But the next week, with the entry for March 31, the message changes back to *BUY/HOLD*. You convert back to the Fund.

If you prefer, you can get the historical Friday prices for the instrument in question and the Friday Dow averages. That way, if the signal returns *BUY/HOLD*, you can invest in your instrument right away and maximize the return on your investment. Just go to your library and look up the information in the Monday editions of *The Wall Street Journal*.

### ALLOWING FOR DIVIDENDS

Whenever an investment pays a dividend, its price is lowered by the amount of the dividend. You must adjust the predividend prices to keep the worksheet from giving false sell signals. The dividend macro, *\d*, in rows 18 to 25 of figure 3, makes it easy to revise the list of fund prices.

Whenever a dividend is announced, retrieve the worksheet and start the dividend macro. First, you're prompted for the date and the amount of the dividend. The macro copies @IF formulas into the cells in column A that are adjacent to the table of dates and prices. The resulting formulas subtract the dividend amount from those fund prices whose dates fall prior to the dividend date. The results of the formulas are copied to the column of fund prices, and the formulas themselves are erased.

To see this work, press MACRO-D. You see the prompt *Enter dividend date*. Enter 3/1/89. Next you see *Enter dividend amount*. Enter .26. When the macro stops, compare the Fund prices in your worksheet with those in column C of figure 2. You'll see that the prices in range C19..C26 are now 26 cents less than they were.

### MODIFYING THE WORKSHEET

We've used a 10-week moving average to keep the demonstration of the worksheet simple. A 10-week moving average is sensitive to small fluctuations in the market. In practice, you may want to use a longer moving average, as this can reduce the number of trades you make. If you're allowed to buy or sell your mutual fund without commissions or penalties, it's OK to use a short moving average. You may want to do this if you think the market is getting ready to make a dramatic move up or down. But for funds that charge commissions or for stocks, which always charge commissions, reducing the number of trades is important.

Here's how you can change the worksheet so that it will base its results on a 20-week moving average.

First, erase range E28..F31. The moving-average formulas must start at the 20th row of the table, in row 38 of the worksheet. Enter the formula @AVG(C19..C38) in cell E38, and copy cell E38 to cell F38. Then copy the first signal formula, in cell G28, to cell G38, and erase range G28..G31. Redefine the named ranges *startup* and *formulas* by using the Range Name Create command. The new coordinates are B18..B38 for the range named *startup* and E38..G38 for the range named *formulas*. Finally, edit the label in cell J10, changing the characters 11 to 21.

The only other change you must make is to enter appropriate labels in cells A10, C17, and E16. If you use something besides the Dow averages as a confirming indicator, you will also change the labels in cells A11, D17, and F16.

## KEEP A WATCHFUL EYE

After you run the *\u* macro and, if necessary, the *\d* macro, make a printout of range A1..G11 and keep it handy through the following week. Follow the closing Dow average each day. You can hear it during many evening-news broadcasts on radio or network TV. If your printout says *BUY/HOLD* and the Dow goes below last Friday's moving average, or if the printout says *WAIT/SELL* and the Dow goes above the moving average, you should check the closing price of your instrument the next morning. You may need to call your broker to get this, or you may be able to look it up in *The Wall Street Journal*. If your investment has crossed its moving average in the same direction as the Dow, you should sell or buy back your investment, depending on the case.

You can skip this step and perform weekly updates, initiating buy and sell orders only on Mondays. But this can get you into trouble if the market is volatile. As you'll recall, the October 1987 crash occurred on a Monday. On Thursday, October 15, the Dow and the Fund both went below their moving averages for Friday, October 9. Therefore, I converted my Fund to a money market on Friday the 16th. Prices fell so rapidly the morning of Monday the 19th that checking the moving averages over the weekend and taking action on Monday would have been too late.

Finally, remember that no computer program or any other gimmick can make you infallible. But if you use this template together with your own good sense and a qualified broker's advice, you may come out a little bit ahead in the investment game. ■

## HOW TO SET UP THE INVESTMENT-TIMER WORKSHEET

### 1. Default settings

**Recalculation:** Manual

*1-2-3:* /Worksheet Global Recalculation Manual
*Symph:* MENU Settings Recalculation Method Manual Quit

**Format:** Fixed 2
*1-2-3:* /Worksheet Global Format Fixed, press Return
*Symph:* MENU Settings Format Fixed, press Return, select Quit

### 2. Cell formats

| Format | Range |
|---|---|
| Date 4 | E9 |
| Percent 1 (*Symph*: % 1) | G10..G11 |
| Fixed 0 | G28 |
| Date 4 | B19..B26 |

For example, to set the format of cell E9, select

*1-2-3:* /Range Format Date 4, indicate cell E9
*Symph:* MENU Format Date 4, indicate cell E9

### 3. Labels

Enter the labels shown in figure 1, but don't enter anything in cell D5.

Enter \= in cell D4 and copy cell D4 to cell D6 and to range F9..G9. Right-align the labels in cell C9 and in range F8..G8: Select /Range Label Right (*Symph*: MENU Range Label-Alignment Right), then specify the appropriate cell or range.

Enter the labels shown in rows 16 and 17 of figure 2, then center them: Select /Range Label Center (*Symph*: MENU Range Label-Alignment Center) and specify range B16..G17. Copy cell D4 to range B18..G18.

Enter all the labels shown in figure 3 except for the entry in cell J31. Type an apostrophe before entering any label that begins with @, /, or \. If you use *Symphony*, substitute {MENU} for / in the following cells and ranges: J5, J7, J9, J11..J14, and J22..J23. In cell J24, replace /RE with {MENU}E.

### 4. Values

Enter the values in range C19..D26 of figure 2. Then enter the date values in range B19..B26: Select /Data Fill (*Symph*: MENU Range Fill), enter 32514 as the start value, 7 as the step value, and 100000 as the stop value. You will create the rest of the table by working through the instructions in the main part of the article.

### 5. Range names

To assign names to individual cells in column J, press slash (*Symph*: MENU), select Range Name Labels Right, and specify range I1..I41. Then assign the following additional range names:

| Name | Range |
|---|---|
| *input* | E9..E11 |
| *display* | D5..G11 |
| *fund* | F10 |
| *dowj* | F11 |
| *sig* | G17 |
| *update* | A19 |
| *formulas* | E28..G28 |
| *startup* | B18..B28 |

For example, to assign the name to range E9..E11, press slash (*Symph*: MENU), select Range Name Create, enter *input*, and specify range E9..E11.

### 6. Formulas

| Cell | Formula |
|---|---|
| **D5** | @IF(sig=1,"BUY/HOLD","WAIT/SELL") |
| **G10** | (E10−fund)/fund |

Copy cell G10 to cell G11.

| Cell | Formula |
|---|---|
| **E28** | @AVG(C19..C28) |

Copy cell E28 to cell F28.

| Cell | Formula |
|---|---|
| **G28** | @IF(E28<C28#AND#F28<D28,1,<br>@IF(G27=1#AND#<br>(F28<D28#OR#E28<C28),1,0)) |
| **J27** | @IF(K27<$resp1,L27−$resp2,L27) |
| **J31** | +"{GETLABEL "&dtprompt&",resp1}" |

The formulas in cells G10, G11, and J31 initially return ERR.

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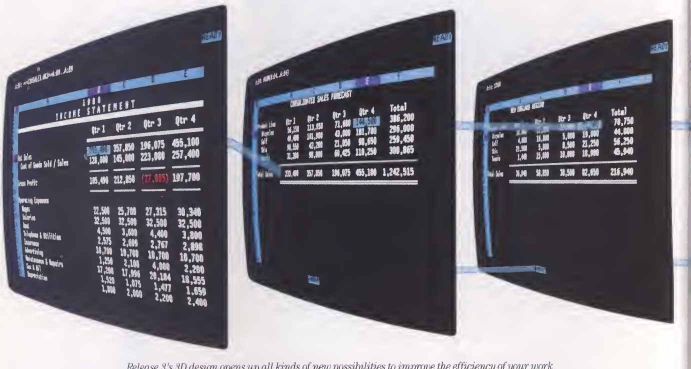

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[1] *InfoWorld* July 17, 1989 *In Canada call 1-800-668-1509 Ask for Department 13. © 1989 Lotus Development Corporation Lotus and 1-2-3 are registered trademarks of Lotus Development
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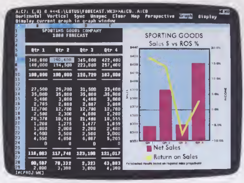

```
A:C7: (,0) 0 +<<E:\LOTUS\FORECAST.WK3>>A:C8..A:C8
Horizontal  Vertical  Sync  Unsync  Clear  Map  Perspective  Graph  Display
Display current graph in graph window
```

SPORTING GOODS COMPANY

Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4

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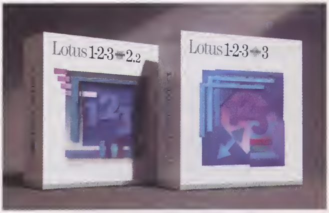

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# ANTICIPATING BUSINESS CYCLES

## Are your fortunes about to change? Knowing the answer can help you make smarter business plans.

BY EVERETTE S. GARDNER JR.

In the 1970s, Parker Hannifin Corp., of Cleveland, Ohio, developed a mathematical model that it used to spot turning points in the business cycle. This model, described in *Industry Week* (April 25, 1977), is well suited to electronic spreadsheets. The goal of the model is simple: Detect changes in the rate of growth of a set of data and, in doing so, identify the turning points, or peaks and troughs, of cycles.

As of this writing, some financial observers are saying that the business cycle is dead and that recessions are a thing of the past. Others believe that the Federal Reserve has prevented a recession, at least for now, by bringing the economy in for a "soft landing." They also predict that there will be a period of slow growth that will allow the economy to catch its breath before it resumes its vigorous expansion.

I am skeptical. I believe the business cycle is alive and well, and I doubt the soft-landing theory. To paraphrase David Wessel's "Outlook" column in *The Wall Street Journal* (June 5, 1989), when things look too good to be true, they probably are.

### UNDERSTANDING CYCLES

The worksheet described here, an adaptation of the Hannifin Corp.'s model, helps you determine where in the cycle you are. This information can help you with your business decisions.

Take a look at the graph shown in figure 1. It shows new orders for metalworking machinery, measured in millions of dollars, for January 1972 to September 1974. Notice the sharp dip in the graph in January 1974. To put this in perspective, consider that the National Bureau of Economic Research now says that the economy in general was in a recession from November 1973 to March 1975. Of course, no one knew for sure in late 1974 that the picture would improve in 1975. If you were the business planner for a company in this industry at the time, you would have questioned whether the dip at the beginning of 1974 was really a bottoming out or just a fluctuation.

You can find the answer to this question by computing and graphing sets of "pressures." Pressures are values that show how sales or orders for a period compare with the same period a year earlier. Figure 2 shows a graph of 1/12 pressures. The number 1 means that the index numbers are based on single-month totals and the number 12 means that the totals are separated by 12 months.

The first point plotted is the ratio of January '73 orders to January '72 orders multiplied by 100; the second point plotted is the ratio of February '73 orders to February '72 orders multiplied by 100, and so forth. Multiplying each ratio by 100 forms an index number that is easy to interpret. If the index for a month is 100, orders for that month are unchanged from a year ago. If the index is greater than 100, orders have grown from a year ago. If the index is less than 100, orders have declined.

The 1/12 pressures decline in an erratic pattern during 1973. All of the pressures in figure 2 are greater than 100, meaning that orders were higher than in the same month a year earlier. But the key point is that growth was slowing. You infer this from the generally negative trend in pressures. In January 1974 a turning point occurred when the 1/12 pressures bottomed out near 100. That is, orders

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*Everette S. Gardner Jr. is professor of decision and information sciences at the University of Houston, director of the International Institute of Forecasters, and coauthor of* Quantitative Approaches to Management, *seventh edition (McGraw-Hill, 1989).*

ILLUSTRATIONS BY FRED LYNCH

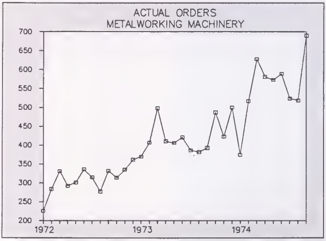


**FIGURE 1.** This graph plots orders for metalworking machinery, measured in millions of dollars, for January 1972 through September 1974. The steep dip in January 1974 seems to indicate that the cycle for this industry has reached a trough and that business is about to improve. But it would have been risky, in late 1974, to come to that conclusion on the basis of this graph alone.

in that month were about the same as they were a year earlier. Starting in February, growth picked up again, and the 1/12 pressures reached a level of more than 175 by September.

The graph in figure 2 confirms that the early part of 1974 was a turning point and that things will improve in 1975. For more confirmation, you can compute and plot the 3/12 pressures and 12/12 pressures. The 3/12 pressures show how the numbers in each three-month period compare with the same period a year earlier. In figure 3 the first point plotted is the ratio of January-through-March '73 orders to January-through-March '72 orders multiplied by 100. The second point plotted is the ratio of February-through-April '73 orders to February-through-April '72 orders multiplied by 100. Note that the 3/12 pressures suggest a turning point in March 1974 rather than January 1974.

Figure 4 shows the graph of 12/12 pressures—that is, consecutive 12-month totals compared with the same totals a year earlier. The first point plotted is the ratio of January-through-December '73 orders to January-through-December '72 orders multiplied by 100. The second point plotted is the ratio of February '73-through-January '74 orders to February '72-through-January '73 orders multiplied by 100. The 12/12 pressures are always smoother and easier to read than the others. In figure 4 they show a dramatic turning point in March 1974, the same month marked by the 3/12 pressures. The implication is that a new period of growth for the metalworking-machine market started around April 1974.

## INTERPRETING THE PRESSURES

Why did the 1/12 pressures disagree with the others about the timing of the turning point? This discrepancy simply reflects randomness in the data. As long as the

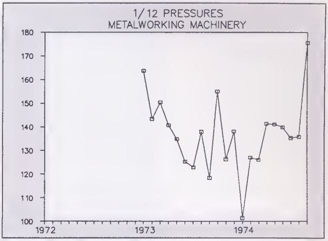


**FIGURE 2.** This graph shows how the orders for each month compare with orders in the same month a year earlier. All the points are above 100, meaning that each month's sales are higher than they were exactly a year earlier. The dip in January 1974 confirms the indication of the actual-orders graph that the cycle bottoms out in early 1974.

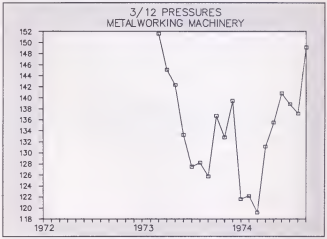


**FIGURE 3.** This graph shows how orders for three-month periods compare with orders from the same period a year earlier. There is a dip in March 1974, not in January as indicated in the 1/12-pressures graph. Still, this is close enough to confirm the notion that the cycle trough occurred in early 1974.

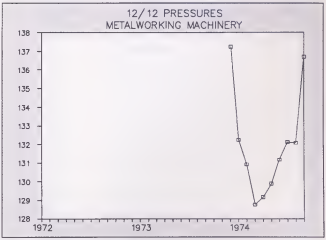


**FIGURE 4.** This graph shows how orders for 12-month periods compare with orders from the same period a year earlier. The dip in this graph occurs in March 1974 as it does in the 3/12 pressures graph, giving additional confirmation that a turning point occurred in early 1974.

turning points based on different pressures occur within a few months of each other, you can be confident that the trend has run its course—that is, the trend has reached a peak or a trough.

If the timings of the turning points are substantially different, you should be more cautious about the future. Pressures analysis is not foolproof, and randomness may prevent the formation of definite patterns. The 1/12, 3/12, and 12/12 pressures are the ones most often used by businesses. You may also want to look at 6/12 and 9/12 pressures when your results are ambiguous.

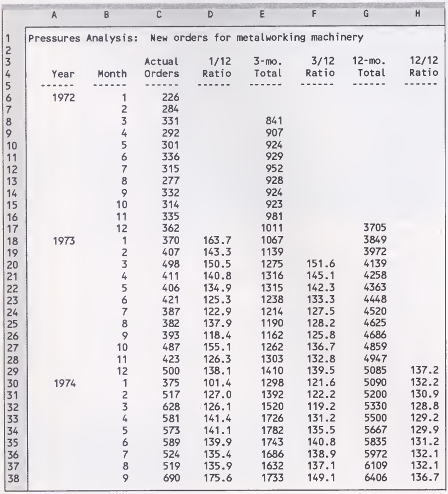
I recommend that you get in the habit of adding pressures to your forecasting worksheets, especially when your projections extend more than a few months into the future. If a turning point appears in the pressures, you may want to temper or boost the projections you formulate when you use other forecasting methods. You should also keep an eye on the trends in pressures. For example, a projection of strong growth in sales is less likely to be right when the recent trend in pressures is down.

## USING THE WORKSHEET

The worksheet shown in figure 5 contains the data and formulas that produce all the graphs we've looked at. First create the worksheet by following the instructions in the box on the facing page. Then work through the instructions that follow to create, name, and view the graphs. The next two paragraphs give instructions for *1-2-3*. The following two paragraphs give instructions for *Symphony*. When you display the graphs, the Y-axis scaling may appear different from the illustrations, depending on the release of *1-2-3* or *Symphony* you use.

In *1-2-3* press slash, select Graph X, specify range A6..A38, select A, specify range C6..C38, select Options Titles First, enter *ACTUAL ORDERS*, select Titles Second, and enter *METALWORKING MACHINERY*. Select Quit Name Create and enter the graph name *actual*. To create the 1/12-pressures graph, select A, press Backspace to clear the existing range, specify range D6..D38, select Options Titles First, press Escape to remove the existing title, enter *1/12 PRESSURES*, select Quit Name Create, and enter the graph name *1/12*. To create the 3/12-pressures graph, select A, press Backspace, specify range F6..F38, select Options Titles First, press Escape, enter *3/12 PRESSURES*, select Quit Name Create, and enter the graph name *3/12*. To create the 12/12-pressures graph, select A, press Backspace, specify range H6..H38, select Options Titles First, press Escape, enter *12/12 PRESSURES*, select Quit Name Create, and enter the graph name *12/12*.

To view the *1-2-3* graphs, select Name Use, then select



| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Pressures Analysis:  New orders for metalworking machinery | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | Actual | 1/12 | 3-mo. | 3/12 | 12-mo. | 12/12 |
| 4 | Year | Month | Orders | Ratio | Total | Ratio | Total | Ratio |
| 5 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |
| 6 | 1972 | 1 | 226 | | | | | |
| 7 | | 2 | 284 | | | | | |
| 8 | | 3 | 331 | | 841 | | | |
| 9 | | 4 | 292 | | 907 | | | |
| 10 | | 5 | 301 | | 924 | | | |
| 11 | | 6 | 336 | | 929 | | | |
| 12 | | 7 | 315 | | 952 | | | |
| 13 | | 8 | 277 | | 928 | | | |
| 14 | | 9 | 332 | | 924 | | | |
| 15 | | 10 | 314 | | 923 | | | |
| 16 | | 11 | 335 | | 981 | | | |
| 17 | | 12 | 362 | | 1011 | | 3705 | |
| 18 | 1973 | 1 | 370 | 163.7 | 1067 | | 3849 | |
| 19 | | 2 | 407 | 143.3 | 1139 | | 3972 | |
| 20 | | 3 | 498 | 150.5 | 1275 | 151.6 | 4139 | |
| 21 | | 4 | 411 | 140.8 | 1316 | 145.1 | 4258 | |
| 22 | | 5 | 406 | 134.9 | 1315 | 142.3 | 4363 | |
| 23 | | 6 | 421 | 125.3 | 1238 | 133.3 | 4448 | |
| 24 | | 7 | 387 | 122.9 | 1214 | 127.5 | 4520 | |
| 25 | | 8 | 382 | 137.9 | 1190 | 128.2 | 4625 | |
| 26 | | 9 | 393 | 118.4 | 1162 | 125.8 | 4686 | |
| 27 | | 10 | 487 | 155.1 | 1262 | 136.7 | 4859 | |
| 28 | | 11 | 423 | 126.3 | 1303 | 132.8 | 4947 | |
| 29 | | 12 | 500 | 138.1 | 1410 | 139.5 | 5085 | 137.2 |
| 30 | 1974 | 1 | 375 | 101.4 | 1298 | 121.6 | 5090 | 132.2 |
| 31 | | 2 | 517 | 127.0 | 1392 | 122.2 | 5200 | 130.9 |
| 32 | | 3 | 628 | 126.1 | 1520 | 119.2 | 5330 | 128.8 |
| 33 | | 4 | 581 | 141.4 | 1726 | 131.2 | 5500 | 129.2 |
| 34 | | 5 | 573 | 141.1 | 1782 | 135.5 | 5667 | 129.9 |
| 35 | | 6 | 589 | 139.9 | 1743 | 140.8 | 5835 | 131.2 |
| 36 | | 7 | 524 | 135.4 | 1686 | 138.9 | 5972 | 132.1 |
| 37 | | 8 | 519 | 135.9 | 1632 | 137.1 | 6109 | 132.1 |
| 38 | | 9 | 690 | 175.6 | 1733 | 149.1 | 6406 | 136.7 |

**FIGURE 5. This worksheet is used to produce the four graphs. Range A6..A38 is used as the X range for all graphs. Range C6..C38 is used as the A range for the graph of actual orders. Range D6..D38 is the A range for the graph of 1/12 pressures; range F6..F38 is the A range for the graph of 3/12 pressures; and range H6..H38 is the A range for the graph of 12/12 pressures.**

Actual from the menu. The graph in figure 1 appears on your screen. Press any key to clear the graph and return to the Graph menu. Select Name Use and select 1/12 from the menu. Press any key, then select Name Use to view the 3/12 and 12/12 graphs. When you finish viewing the graphs, select Quit.

In *Symphony* you press MENU, then select Graph 1st-Settings Name Create, enter the graph name *actual*, select Range X, specify range A6..A38, select A, specify range C6..C38, and select Quit. Select Switch Titles First, enter *ACTUAL ORDERS*, select Second, enter *METAL-WORKING MACHINERY*, and select Quit. To create the 1/12-pressures graph, select Switch Name Create, enter the graph name *1/12*, select Range A, press Backspace to clear the existing range, specify range D6..D38, select Quit Switch Titles First, press Escape to remove the existing title, enter *1/12 PRESSURES*, and select Quit. To create the 3/12-pressures graph, select Switch Name Create, enter the graph name *3/12*, select Range A, press Backspace, specify range F6..F38, and select Quit. Select Switch Titles First, press Escape, enter *3/12 PRESSURES*, and select Quit. To create the 12/12-pressures graph, select Switch Name Create, enter the name *12/12*, select Range A, press Backspace, specify range H6..H38, and select Quit. Select Switch Titles First, press Escape, enter *12/12 PRESSURES*, and select Quit 1st-Settings to return to the 1st-Settings menu.

To view the *Symphony* graphs, select Name Use, select Actual from the menu, then select Quit Preview. The graph shown in figure 1 appears on your screen. Press any key to clear the graph and return to the graph menu. Select 1st-Settings Name Use, select 1/12 from the menu, and select Quit Preview. Press any key, then use the 1st-Settings Name Use and Quit Preview commands to select and view the remaining two graphs. When you're finished viewing the graphs, select Quit.

Once the worksheet and named graphs are set up, enter an appropriate label in cell A1 and replace the sample data in column C with historical sales or orders for your company or industry. Replace the year numbers in column A with the correct ones. Be sure to position the year numbers in the correct cells and enter the appropriate sequences of month numbers in column B. If you use more than two and three quarter years of data, enter additional year and month numbers as needed, and copy the formulas in range D38..H38 into as many new rows as necessary. Press the CALC key after making changes. Then return to the Graph menu, use the Name Use command to select each of the graphs, and adjust the X and A ranges to include all the new entries. ■

## HOW TO SET UP THE BUSINESS-CYCLE WORKSHEET

### 1. Default settings

**Recalculation:** Manual

*1-2-3*: /Worksheet Global Recalculation Manual
*Symph:* MENU Settings Recalculation Method Manual Quit

### 2. Cell formats

| Format | Range |
|---|---|
| Fixed 1 | D18, F20, H29 |

For example, to set the format of cell D18, select

*1-2-3*: /Range Format Fixed, enter 1, specify cell D18
*Symph:* MENU Format Fixed, enter 1, specify cell D18

### 3. Labels

Enter the labels shown in rows 1 through 4 of figure 5. Right-align the labels in rows 3 and 4: Select /Range Label Right (*Symph:* MENU Range Label-Alignment Right) and specify range A3..H4. Enter "------ in cell A5 and copy cell A5 to range B5..H5.

### 4. Values

Enter the year numbers shown in column A.

If you use *1-2-3* Release 2.2, you will improve the appearance of the graph if you enter a space in cell A7, then copy cell A7 to ranges A8..A17, A19..A29, and A31..A38.

Enter the numbers 1 to 12 in range B6..B17: Select /Data Fill (*Symph:* MENU Range Fill), specify range B6..B17 as the range to fill, enter 1 as the start value, and press Return three times to accept the default step and stop values. Copy range B6..B17 to cell B18, then copy range B6..B14 to cell B30.

Enter the values shown in range C6..C38.

### 5. Formulas

| Cell | Formula |
|---|---|
| D18 | +C18/C6*100 |

Copy cell D18 to range D19..D38.

| | |
|---|---|
| E8 | @SUM(C6..C8) |

Copy cell E8 to range E9..E38.

| | |
|---|---|
| F20 | +E20/E8*100 |

Copy cell F20 to range F21..F38.

| | |
|---|---|
| G17 | @SUM(C6..C17) |

Copy cell G17 to range G18..G38.

| | |
|---|---|
| H29 | +G29/G17*100 |

Copy cell H29 to range H30..H38. Press the CALC key.

# *Anatomy of a Symphony Database*

## Learn how to use windows and ranges. And balance your checkbook while you're at it.

BY PAUL WILKERSON

Building a database in *Symphony* is easy, but exploiting it is slightly more difficult. When you work in a *Symphony* database, you are actually using two work environments, SHEET and FORM. With a little extra work and a thorough understanding of the various database ranges, you can ensure that your database contains only the kinds of data you want.

That may sound a little obtuse, so let's consider a problem for which a database is the perfect solution: a check register. We presented a *1-2-3* check register database in the June issue. Like that register, the one presented here allows you not only to record transactions but also to reconcile your account instantly and to summarize transactions according to budget category codes. This version was specifically designed to utilize *Symphony*'s distinctive database features.

### GENERATE THE DATABASE

Where to position the database on the worksheet is an important consideration. You might want to adopt the convention used in our sample database. Here you'll set aside eight columns to hold any macros, tables, and so on, that you might use in your final database system. It's not important that you fill this space immediately. But as you refine your database, you'll want to have an area for this kind of miscellaneous material.

So to begin you'll create a new SHEET window and name it UTILITY. Press SERVICES, select Window Create, enter *utility*, and select SHEET as the window type. Next *Symphony* prompts you to identify the window area. Press Return to accept a full screen. Next the Window settings sheet appears. Select Restrict Range, specify A1..H8192, and select Quit.

Next press the WINDOW key to switch to the window named MAIN. Select SERVICES Window Settings Restrict Range. Specify range I1..IV8192. Then select Quit twice.

Now you have two windows, one named UTILITY and the other named MAIN. You'll do all your database work in the MAIN window, while you'll enter tables, macros, and so forth in the window named UTILITY. To switch between windows, just press the WINDOW key. When you do so, the window name in the lower-right corner of the screen changes to reflect the current window.

To build a database, you must first define its structure in *Symphony*. Listing the fields is easy, but it requires a certain syntax. You list the field specifications in the SHEET or DOC window. The correct form is *name:type:length*. Before you enter any fields, let's review what each portion of this specification controls.

The field names act as headings for the columns in the database, as well as titles for the blanks in the database form. The names you specify can contain any characters except the underline (_) or colon (:).

The field length determines the maximum number of characters you can enter in each field. When you specify a field length, add several extra characters if the field will be formatted. The field length you specify determines both the number of underscore characters that appear following the field names in the form and the column width of the corresponding database field in the sheet.

The field type defines the kind of information that will go into each field. *Symphony* has five designated field types, and each has its own code:

1. Label, code L, is for text or data that *Symphony* will treat as text.

2. Number, code N, contains only numeric data. Be sure to specify this code for fields that will contain data to be used in calculations or formulas. Also specify this code for fields that you'll want to format for currency, percent, and the like.

3. Date, code D, is for date values. *Symphony* automatically formats a date field with the Date 1 (DD-MMM-YY) format. Because dates are stored as serial numbers, you can use the data from a date field in your calculations and formulas. This format requires a column width of at least 10.

4. Time, code T, is for time values. *Symphony* automatically formats a time field with the Time 1 format (hour:minute:second AM/PM). This format requires a column width of at least 12.

5. Computed, code C, contains the result produced by a

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formula that refers to other fields in the same record. Every time you enter data in a field, *Symphony* recalculates the computed fields for that record. Since the recalculation occurs in the order that fields appear, be sure to position a computed field after the fields on which it depends.

Make sure that the MAIN window is current. Then enter the field names, types, and lengths for the check register database in the cells indicated:

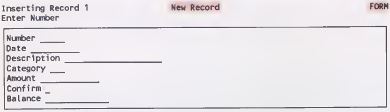
| **Cell** | **Entry** | **Cell** | **Entry** |
|---|---|---|---|
| **I1** | Number:L:5 | **I5** | Amount:N:12 |
| **I2** | Date:D:10 | **I6** | Confirm:L:1 |
| **I3** | Description:L:20 | **I7** | Balance:C:13 |
| **I4** | Category:L:3 | | |

After entering the field specifications, press the TYPE key and select the FORM environment from the menu. The message *No Definition range defined* and a blank FORM window appear. Select MENU Generate, and a menu of default field types appears. Press Return to select Label. Then *Symphony* displays the default field length; press Return to accept it. Next you're prompted to specify the name of the Database settings sheet. For this example, type *check* and press Return.

*Symphony* switches back to the SHEET environment. Now you must specify the range of field names, range I1..I7. *Symphony* presents you with the entry form shown in figure 1.

Besides creating this form, *Symphony* has created a Database settings sheet, shown in figure 2. To see this

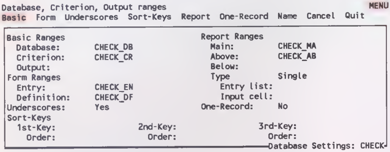
LILLA ROGERS



```
Inserting Record 1              New Record                    FORM
Enter Number

 Number _____
 Date __________
 Description ____________________
 Category ___
 Amount ____________
 Confirm _
 Balance _____________
```

FIGURE 1. Default entry form



```
Database, Criterion, Output ranges                                    MENU
Basic  Form  Underscores  Sort-Keys  Report  One-Record  Name  Cancel  Quit

 Basic Ranges                          Report Ranges
   Database:       CHECK_DB              Main:          CHECK_MA
   Criterion:      CHECK_CR              Above:         CHECK_AB
   Output:                               Below:
 Form Ranges                             Type           Single
   Entry:          CHECK_EN                Entry list:
   Definition:     CHECK_DF                Input cell:
 Underscores:      Yes                 One-Record:      No
 Sort-Keys
   1st-Key:                2nd-Key:                   3rd-Key:
     Order:                  Order:                     Order:
                                                   Database Settings: CHECK
```

FIGURE 2. Database settings sheet

sheet, select MENU Settings. This sheet keeps track of all of the ranges in the SHEET window of the database. Once you've looked it over, select Quit. You'll hear more about all these ranges in a moment.

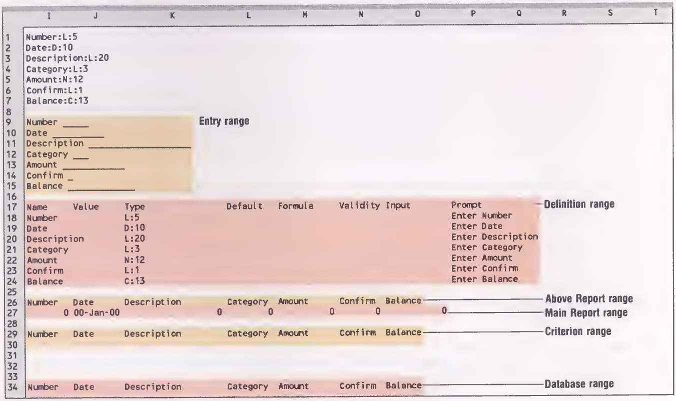
Press the SWITCH key. Now you're viewing the SHEET window of the database. Your worksheet should look like the one in figure 3. The field specifications you entered to generate the form are in range I1..I7. The Entry range, I9..I15, is also the template that *Symphony* uses in the FORM window.

These ranges are relatively simple. The Definition range, which we'll explore next, is the most complex range in the database.

## THE DEFINITION RANGE

The Definition range, shown in range I18..P24 of figure 3, directs traffic between the database and the entry form. When you generate the database, *Symphony* automatically fills in the *Name*, *Type*, and *Prompt* columns, which we'll discuss in more detail in a moment. Note that the columns in figure 3 have been widened to display the contents of the Definition range. Understanding how this range works is key to making your database work harder for you. Each row in the Definition range defines one field of the database.

*Symphony* doesn't include the column headings shown in the Definition range as part of that range. They are for your reference only. Since the columns of this range play an important role in managing your data, let's spend some time learning about them. The *Name* column, shown in range I17..I24 of figure 3, contains the field names for the database. The number of field names in the Entry range must match the number of fields in the Definition range. If it doesn't, *Symphony* displays the error message *Entry/Definition ranges mismatched*, and you cannot use the entry form.



```
     I        J        K          L        M         N       O        P       Q      R      S      T
1  Number:L:5
2  Date:D:10
3  Description:L:20
4  Category:L:3
5  Amount:N:12
6  Confirm:L:1
7  Balance:C:13
8
9  Number _____
10 Date __________
11 Description ____________________
12 Category ___
13 Amount ____________
14 Confirm _
15 Balance _____________
16
17 Name     Value    Type                Default  Formula    Validity Input      Prompt
18 Number            L:5                                                         Enter Number
19 Date              D:10                                                        Enter Date
20 Description       L:20                                                        Enter Description
21 Category          L:3                                                         Enter Category
22 Amount            N:12                                                        Enter Amount
23 Confirm           L:1                                                         Enter Confirm
24 Balance           C:13                                                        Enter Balance
25
26 Number   Date     Description         Category Amount     Confirm  Balance
27        0 00-Jan-00              0            0          0        0         0
28
29 Number   Date     Description         Category Amount     Confirm  Balance
30
31
32
33
34 Number   Date     Description         Category Amount     Confirm  Balance
```

FIGURE 3. *Symphony* database ranges

The *Default* column, shown in range L17..L24, is where entries that will appear automatically in each field are stored. (The sample database has no defaults.) Don't feel constrained by default values. You can easily override them by entering new data, or you can use them selectively. Suppose, for example, you know you'll be entering 30 checks to the same payee. Just enter the payee's name in cell L20, switch to the FORM window, and enter the records. Once you finish, erase the entry in the *Default* column.

The *Type* column, shown in range K17..K24, contains the field specifications you entered when first building the database. The field type and length that are specified control the data entry to the corresponding field. Like the *Name* column, the *Type* column must contain an entry for each field in the Entry range.

The *Input* column, shown in range O17..O24, receives data from the entry form and stores it temporarily. Once you press the Insert key in order to copy the data from the form to the database, the *Input* column becomes blank again.

The *Formula* column, shown in range M17..M24, stores formulas that calculate the values of computed fields or that modify other fields. The formula should refer to the corresponding cell in the *Input* or *Value* column. If you use absolute cell references or range-name references, a formula in the *Formula* column can refer to cells outside the Definition range.

Now continue building the check register database by entering the following formulas in the cells indicated:

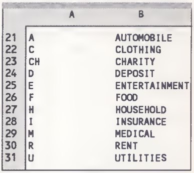
| Cell | Formula |
|---|---|
| **M20** | @UPPER(O20) |
| **M21** | @UPPER(O21) |
| **M22** | @IF(J21="D",O22,-O22) |
| **M23** | @UPPER(O23) |
| **M24** | @IF(O22,@DSUM(check_db,4,check_cr)+J22,@DSUM(check_db,4,check_cr)) |

The formulas for the *Description*, *Category*, *Amount*, and *Confirm* fields make sure that those entries are all in uppercase. These formulas initially return ERR because they have no data to compute. The formula for the *Amount* field forces a negative value for all expenditures and a positive value for all deposits. The formula for the *Balance* field computes the new balance. It adds the amount on the current record to the database sum of the amount column in the database. The *Balance* field will always calculate the correct balance on a new record.

The *Value* column, shown in range J17..J24, receives the data next. Assign formats as needed to cells in this column. In the example, you'll want to format cells J22 and J24 for currency with two decimal places. Move the pointer to each cell in turn and select MENU Format Currency, and press Return twice. Doing so ensures that the *Amount* and *Balance* fields of the database and entry form will appear correctly formatted.

The *Validity* column, shown in range N17..N24, performs the last check on the data. Logic formulas in this column cause *Symphony* to accept only those entries that meet special requirements. Using this column, you can eliminate most data-entry errors. Formulas in the *Validity* column should refer to the corresponding entry in the *Value* column.

Now enter the following category table, which the validity formulas in this model will use. Press the WINDOW key to move to the UTILITY window. Then enter the table shown to the right.



| | A | B |
|---|---|---|
| 21 | A | AUTOMOBILE |
| 22 | C | CLOTHING |
| 23 | CH | CHARITY |
| 24 | D | DEPOSIT |
| 25 | E | ENTERTAINMENT |
| 26 | F | FOOD |
| 27 | H | HOUSEHOLD |
| 28 | I | INSURANCE |
| 29 | M | MEDICAL |
| 30 | R | RENT |
| 31 | U | UTILITIES |

Next, select MENU Range Name Create, enter the name *table*, and specify range A21..B31. Now press the WINDOW key to move to the MAIN window.

Enter the following validity formulas in the cells indicated. The formulas in cells N21 and N23 initially return ERR.

| Cell | Formula |
|---|---|
| **N19** | +J19<=@NOW |
| **N21** | @VLOOKUP(J21,table,0)+1 |
| **N23** | +J23="Y"#OR#J23="" |

You might wonder what exactly these formulas are checking. The formula in cell N19 will not allow you to postdate a check. The formula in cell N21 ensures that the category code you specify matches one you have already defined in the range named *table*. You may add as many other categories as you wish to *table* and to the category table located in the FORM window. If you do so, remember to use the MENU Range Name Create command to redefine *table*. The formula in cell N23 ensures that you can enter either a Y in the cell or press Return to leave an empty string in the cell. Y indicates a cleared transaction. A blank string indicates that the transaction hasn't cleared.

The *Prompt* column contains the text that appears in the control panel as you move the pointer to each field of the form. You may modify each prompt as you wish. Enter the revised prompts as shown below:

| Cell | Entry |
|---|---|
| **P18** | Enter check number |
| **P19** | Enter date in MM/DD/YY format |
| **P20** | Enter description |
| **P21** | Enter budget category |
| **P22** | Enter amount (Do not enter a negative number.) |
| **P23** | Has bank cleared check? (Enter Y for yes or press Return for no.) |

Now that you've explored the columns that compose the Definition range, consider how they work together to manage your data. When you work in a blank entry form, *Symphony* copies any default values to their respective entry fields and to the *Value* column in the worksheet. As you enter data, *Symphony* passes the data, one field at a time, to the *Input* column. At that point, *Symphony* compares the contents of the *Input* column with the corresponding field type specified in the *Type* column. If an entry does not agree, *Symphony* beeps and displays *Invalid field entry*. Next the data passes through a formula, if one exists in the *Formula* column. Then data is entered into the *Value* column, where it is tested against a validity formula, if one exists. If a validity formula evaluates to false, *Symphony* beeps and displays the message *Invalid field entry*. If the formula evaluates to true, *Symphony* copies the data from the *Value* column to the entry form. When you press the Insert or PageUp key, *Symphony* copies the entire record to the Database range.

## ENTER SOME RECORDS

Now you might want to enter some sample records in your check register. Press the SWITCH key and enter a few records. Be sure to enter the first one as a deposit. As you make each field entry, press Return. The pointer will jump to the next field. If you make a mistake, use the Arrow keys to move the pointer back to the field containing the error. Then, you can either retype the entire entry or press the EDIT key and edit only a portion of the entry. If you need to make a change to the *Amount* field, reenter the correct value. Editing the existing value causes *Symphony* to reverse the sign from negative to positive—something you want to avoid. When you're finished filling in the blanks, press the Insert key to add the record to the database.

*Symphony* provides a good system for moving through the data records in the FORM window. The Home key brings up the first record in the database. The End key pulls up the last record. PageUp and PageDown move you one record at a time through the database. Finally, pressing the GOTO key followed by a record number takes you to a specific entry in the database.

**INSERT RECORDS THROUGH THE ENTRY FORM. SYMPHONY KEEPS TRACK OF THE DATABASE RANGE FOR YOU.**

Once you've entered a few records in the FORM window, press the SWITCH key. Move the cell pointer to row 34, which is the first row of the Database range. You'll note that the field names you specified when you first generated the database appear across this row. Subsequent rows contain the records you just entered via the FORM window. Because you formatted the *Date*, *Amount*, and *Balance* fields in the *Value* column of the Definition range, *Symphony* stores data in those formats in the Database range. Although you may occasionally want to view the records in the Database range, don't insert new records here. By inserting records only through the entry form, you ensure that *Symphony* keeps track of the Database range for you.

## THE CRITERION RANGE

The Criterion range—in this case, range I29..O30—allows you to find records that meet certain criteria. The range consists of a row of field names and one or more rows of criteria, which can be values, characters, or formulas that *Symphony* uses to select matching records. You may either enter criteria directly into this range or switch to a FORM window and use a criterion record.

From the FORM window, you create a criterion record by selecting MENU Criteria Edit. You'll see an entry form similar to the one used for data entry. Enter criteria in the appropriate field or fields of this form and then press PageUp. Next press MENU and select Criteria Use. If no match exists, *Symphony* beeps and displays the message *No database records matched by criteria*. If records match, *Symphony* displays a message indicating how many do so on the control panel. Then you can press PageDown to cycle through the matching records. Clear a criterion record by selecting MENU Criteria Edit. Then press the Delete key and select Yes. Next press the Escape key and select Ignore to return to the database records in the FORM window.

## PRINT THE DATABASE

The final data-management range to consider is the Report range, made up of three ranges—Above, Main, and Below—that control how your database looks when you print it.

The Above range is the first row of the Report range. In this example, it's in range I26..O26 of figure 3. The Above range includes the field names for the database. *Symphony* prints the contents of the Above range once at the beginning of the database report. The Above range may refer to the database itself or include other information, such as a header, introductory text, or the upper part of a letter.

If the printout of your check register requires more than one page, you'll want the field names to appear at the top of each page. To accomplish that, switch to the SHEET window, and select MENU Query Settings Cancel Report Quit Quit. This removes all of the report settings from the settings sheet. You'll re-create the one that you want to use in a moment.

Now specify Top-Labels on the Print settings sheet by selecting SERVICES Print Settings Other Top-Labels. Enter range I26..O26 and select Quit twice.

The Main range, which defines the body of the report, is the second row of the Report range, shown in range I27..O27 of figure 3. It identifies which fields in each record you want to print and how you want the information to appear. When you first generate the database, *Sym-*

*phony* automatically enters in the Main range formulas that contain references to the first record in the Database range. When you print a database report, *Symphony* prints the Main range once for every record that meets the criteria in the Criterion range.

You must format cells in the Main range so that they'll appear as you wish in the report. Use the MENU Format command to assign the Currency format with two decimal places to cells M27 and O27 of figure 3. In cell I27 enter the formula @IF(@CELL("type",!number) = "b","", number). In cell L27 enter the formula @VLOOKUP(category,$table,1). This formula ensures that *Symphony* will print not just the budget code but the full category name. Now to specify the Main Report range, select MENU Query Settings Report Main, specify range I27..O27, and select Quit three times.

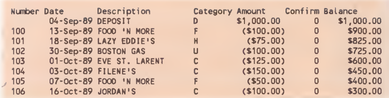
The Below range is the only Report range that *Symphony* does not automatically set up for you. This range functions somewhat like an Above range, in that *Symphony* prints it once at the end of a report. The Below range can contain any information you like. Often this range is used for summary statistics, closing comments, or the end of a letter. To specify a Below range on the Database settings sheet, select MENU Query Settings Report Below. Indicate the range that you want to appear at the end of each report. Then select Quit three times. (Our example won't use a Below range.)

Now to print your report, select SERVICES Print Settings Source Database and indicate CHECK. Because your database may be too wide to fit across a standard page of paper printed with 10 or 12 characters per inch, you may need to specify a setup string for compressed print. Look in your printer manual for the correct string. Make sure that your printer is turned on and is on-line. Then select Quit Align Go Page Quit to print the database. Figure 4 shows a sample printout. For more on printing database reports, see "Multiple-Pass Reports from Your *Symphony* Database" in the July 1987 issue.

## FINAL TOUCHES

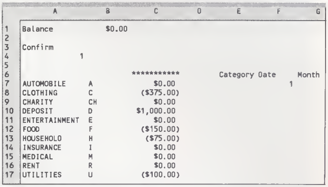
Now you are familiar with the basics of a *Symphony* database. But this database wouldn't be complete without some system for reconciling the account at the end of the month and for summarizing checking activity according to budget category.

To build these sections of the model, press the WINDOW key to switch to the UTILITY window. Use the MENU Width Set command to set the width of column A to 15, the width of column B to 12, and the width of column C to 11. Enter the labels shown in cells A1 and A3 and in range E6..G6 of figure 5. Copy range B21..B31 to cell A7. Copy range A21..A31 to cell B7.



```
Number Date        Description         Category Amount    Confirm Balance
       04-Sep-89 DEPOSIT              D          $1,000.00        0   $1,000.00
100    13-Sep-89 FOOD 'N MORE         F          ($100.00)        0     $900.00
101    18-Sep-89 LAZY EDDIE'S         H           ($75.00)        0     $825.00
102    30-Sep-89 BOSTON GAS           U          ($100.00)        0     $725.00
103    01-Oct-89 EVE ST. LARENT       C          ($125.00)        0     $600.00
104    03-Oct-89 FILENE'S             C          ($150.00)        0     $450.00
105    07-Oct-89 FOOD 'N MORE         F           ($50.00)        0     $400.00
106    16-Oct-89 JORDAN'S             C          ($100.00)        0     $300.00
```

**FIGURE 4. Sample database report**



```
         A              B            C            0          E           F          G
 1 Balance            $0.00
 2
 3 Confirm
 4                 1
 5
 6                          ************              Category Date       Month
 7 AUTOMOBILE     A                $0.00                                1
 8 CLOTHING       C            ($375.00)
 9 CHARITY        CH               $0.00
10 DEPOSIT        D            $1,000.00
11 ENTERTAINMENT  E                $0.00
12 FOOD           F            ($150.00)
13 HOUSEHOLO      H             ($75.00)
14 INSURANCE      I                $0.00
15 MEDICAL        M                $0.00
16 RENT           R                $0.00
17 UTILITIES      U            ($100.00)
```

**FIGURE 5. Balance and budget summary**

Next select MENU Range Name Create to assign the following range names:

| **Name** | **Range** |
|---|---|
| *clear* | A3..A4 |
| *summary* | E6..F7 |
| *month* | G7 |

Then enter the following formulas:

| **Cell** | **Formula** |
|---|---|
| **B1** | @DSUM(check_db,4,$clear) |
| **A4** | +confirm = "Y" |
| **C6** | @DSUM(check_db,4,$summary) |
| **F7** | @IF($month,@month(date) = $month,1) |

Now assign the Currency format and the Bar-graph format to particular cells. Select MENU Format Currency, press Return to accept two decimal places, and specify cell B1. Then use the same procedure to assign that format to range C7..C17. Next select MENU Format Other Bar-Graph and specify cell C6.

To use the balance portion of the model, press the WINDOW key to move to the MAIN window. Then press the SWITCH key. Go back through each record that has cleared your account and enter the letter Y in the *Confirm* field. Press the WINDOW key to switch to the UTILITY window. The figure in cell B1 should match that on your bank statement.

You can summarize your checking activity by month or by year. To summarize by month, enter a number representing the month—that is 1 for January, 2 for February, and so forth—in cell G7. Then select MENU Range What-If 1-Way. Specify a Table range of B6..C17. Specify cell E7 as the input cell. Range C7..C17 fills with values representing the amounts you've spent in each budget category that month.

To perform a yearly summary, erase the value in cell G7. Then follow the steps described above to generate the one-way data table. ■

# If they came back as
# Lotus 1-2-3, Freelance

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# software, they'd be Plus, and Manuscript.

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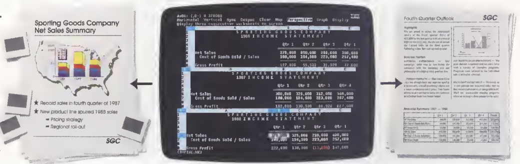
You can import spreadsheet data—in table form—with columns and rows intact. Then easily enhance all your tables with borders and shading. And when your 1-2-3 data changes, Manuscript's "live link" to 1-2-3 brings in the new numbers automatically. With no need to reformat your table.

No wonder Freelance Plus and Manuscript are called the "Perfect Fit" with 1-2-3.



Presentations Spreadsheets Reports

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1-2-3 and Freelance Plus *or* 1-2-3 and Manuscript. Put one of the strongest teams in history to work for you.

## Lotus Freelance Plus
## Lotus Manuscript

---

if you purchase **both** Freelance Plus and Manuscript and send in both Proof of Purchase coupons and sales receipts.) To qualify, you must purchase the full retail version of Lotus Freelance Plus 3.0 (or 3.01) or Manuscript 2.1 from a purchases are not eligible. ***InfoWorld*, April 3, 1989, *PC Week*, July 10, 1989. **For more information about the "Perfect Fit" program and how Freelance Plus and Manuscript work with the new Lotus 1-2-3, call 1 800 343 5414

# If a Data Disaster Strikes...

## *Utilities can rescue your files.*

BY LARRY ROSHFELD

Perhaps this has happened to you. You try to retrieve a spreadsheet file, and something goes wrong. Maybe the file has mysteriously vanished or maybe it is damaged. Maybe you just can't remember the password. Whatever the reason, you are suddenly faced with the loss of important information.

If this has never happened to you, consider yourself fortunate. It's just a matter of time. It's easy to accidentally delete a vital file, either from within *1-2-3* or *Symphony* or from a DOS prompt. If you're in the midst of saving a file when a sudden power surge or blackout hits, serious damage to the file may occur. And more frequently than you might expect, a disgruntled employee may delete or password-protect a vital spreadsheet file.

The key is to be prepared. Then when you face such a situation, you'll know what to do.

### ERASED FILES

EVEN IF YOU'VE ERASED A FILE, YOU CAN GET IT BACK INTACT.

▼

Few things are more frightening to a *1-2-3* or *Symphony* user than the error message *File does not exist*. If you're lucky, the message indicates that you misspelled the file name or that you are looking in the wrong subdirectory or on the wrong floppy disk. But sometimes it means that the file is gone.

Loss of a spreadsheet most often occurs because an entire file has accidentally been deleted from the disk. There are two common causes: careless use of the File Erase command in *1-2-3* or *Symphony*, or the use of the DOS DEL (delete) command at the wrong place or time.

In either case, all is not lost—if you act promptly. Even if you have erased or deleted a file, there is a good chance that you can get it back intact because DOS doesn't really erase a file.

When you issue the command to erase or delete a file, DOS replaces the first character of the file name in the directory with a special character, indicating that the file is no longer needed. The file name no longer appears when you use the DOS DIR (directory) command to list the contents of the disk or directory. But the file remains stored on the disk, and DOS now considers the disk space occupied by that file to be available for use.

So, using an erase or delete command is somewhat analogous to throwing something in a wastebasket. You can get the item back if you remove it from the basket before someone empties the trash.

A number of utility programs allow you to "undelete" or "unerase" a file that you have lost. Some of them even allow you to undelete several files in one step. To undelete a file, most of the utilities cited at the end of this section let you remove that special character from the beginning of the file's name and replace it with the original character.

There is a big catch, however. From the time you delete or erase the file to the time you perform the rescue mission, you must not save anything new on the disk. Since DOS no longer reserves the disk space occupied by your "deleted" file, it may write over that file, or part of it, with any new file.

The major utilities that let you unerase files

---

*Larry Roshfeld is a senior systems engineer for Lotus Development Corp.*

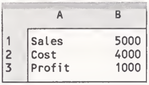
are *The Norton Utilities, Mace Utilities, PC Tools*, and *Disk Optimizer*. For more information on these and the other products mentioned here, see the In Brief box on page 55.

## DAMAGED FILES

Sometimes disaster strikes not because the spreadsheet has been erased but because it has been damaged. You'll know this is the case when you try to retrieve a spreadsheet and receive an error message such as *Not a valid worksheet file* or *Part of file is missing* or *Worksheet file revision is out of date*.

In some cases, if you press the Escape key after receiving one of these messages, you may be able to retrieve a portion of your spreadsheet. In other instances, you may be unable to access any of it. What has happened is that the structure of the spreadsheet has been corrupted. When that occurs, *1-2-3* and *Symphony* cannot interpret the information stored in the file.

To understand what happens when data corruption occurs and what you can or cannot do to recover from the damage, consider how spreadsheet information is stored in a file. Early spreadsheets, such as *VisiCalc*, stored worksheet information in an ASCII file, or text file. For example, the spreadsheet shown on the left below would be stored in the format shown on the right:



|  | A | B |
|---|---|---|
| 1 | Sales | 5000 |
| 2 | Cost | 4000 |
| 3 | Profit | 1000 |

```
>B3:+B1–B2
>A3:"Profit
>B2:4000
>A2:"Cost
>B1:5000
>A1:"Sales
```

Data stored in this text format has a big advantage: You can easily examine and modify it. The format also has a disadvantage: The file takes a long time to load into memory.

Modern spreadsheets, such as *1-2-3* and *Symphony*, store worksheet data in a file made up of data structures known as records. Each file may contain many records, each of which stores a different type of information, such as a label, a number, a formula, a named range, and graph or database settings. In addition to the data, each record contains a header section that describes the type and amount of data stored in it. Within a file, records are stored sequentially and are interpreted as the file is read into memory via either the File Retrieve or the File Combine command. This format stores a large spreadsheet in a very compact form on disk and lets you save and retrieve the file rapidly.

▲
**EVEN MINOR DAMAGE TO A FILE CAN PREVENT YOUR RETRIEVING IT.**

That's what happens when all goes well. But sometimes these records may be corrupted—perhaps by a power surge that occurred when you saved the file or by accidental exposure of the disk to a magnetic source. Neither *1-2-3* nor *Symphony* can interpret corrupted records.

In many cases, only a few of the records in the file are damaged or missing. However, once *1-2-3* or *Symphony* discovers a missing or damaged record in the file structure, the program stops what it was doing—retrieving or combining a file—and returns an error message. Thus, even minor damage to the file will prevent your retrieving it.

If you have a recent backup copy of the spreadsheet, you can use it. If you have no backup copy, you could try to manually rebuild the record structure of the damaged file. All that requires is a few days, a thorough knowledge of the *1-2-3* and *Symphony* file structure, a solid grounding in hexadecimal arithmetic, and a massive amount of patience.

Fortunately, there is a better solution. A utility program called *Rescue Plus* patches the damaged section of records. Then *1-2-3* or *Symphony* can continue to read past those records and retrieve the remaining undamaged portion of the file.

You will undoubtedly lose some information—the data stored in the damaged records. But in the absence of a recent backup copy of the spreadsheet, recovering some of a spreadsheet is often better than rebuilding from scratch.

By now you should be convinced of the

ILLUSTRATIONS BY JOHN MARTINEZ

## BACK UP YOUR FILES

As with many things in life, it's often easier to prevent a problem than it is to resolve it. In the case of erased, damaged, or inaccessible files, regularly making backup copies can often save you hours or days of work when disaster strikes.

If you are not currently creating regular backup copies of your spreadsheets, start now. If you need further convincing, ask yourself a simple question: If I lost this file, would the time it takes to re-create it be substantially greater than the minute it takes to make a backup copy?

Creating a backup copy of a file is simple in *1-2-3* and *Symphony*. You use the File Save command. If you normally save files to a hard disk, save backup copies on a floppy disk. If you normally save files to a floppy disk, save the backup copy on a different floppy disk.

Don't make a backup copy under a different name on the same hard disk. If your PC is stolen or your hard disk crashes, having both copies of the file in one place is no help. And if you normally save files to a network file server, don't assume that someone else is making backup copies for you.

MAKE A BACKUP COPY OF A FILE AS OFTEN AS YOU USE THE FILE.

How often should you make a backup? One guideline is to make a backup copy of a file as often as you use the file. For example, if you use the spreadsheet every day, make a daily backup. At a minimum, back up all your data files for all your application programs at least once a week. To back up your data files, use the DOS BACKUP command, and remember that you'll have to use the DOS RESTORE command to read them back. As an alternative, you can use one of the more sophisticated backup utilities on the market.

For spreadsheets that can make or break your business, consider using the A.M.–P.M. backup system. Let's assume you use a particular spreadsheet throughout the day. Save a copy of the spreadsheet to a disk labeled *A.M.* before you go to lunch. At the end of the day, save the latest version of the spreadsheet, with the modifications that you made that afternoon, to a disk labeled *P.M.* Of course, throughout the day, save the spreadsheet regularly on your hard or floppy disk.

The value of the A.M.–P.M. system becomes obvious when something causes you to lose the copy of the file on your hard disk or nonbackup floppy disk. You can retrieve the file from the last backup that you made, which is on either the A.M. or P.M. disk. Since you back up these critical files twice a day, the most you could lose is half a day's work.

You might wonder why you should use two different disks to back up your files. There are two reasons. The first assumes that you are a tremendously unlucky person and that someday you may accidentally save a damaged version of the file and then unknowingly copy the damaged version onto the backup disk. If that were to happen, you would have two identical damaged copies. But since you have a second backup disk containing the file from half a day ago, the most you would lose is half a day's work.

The second reason is that using two disks gives you the flexibility to store your backups in two different places. You might, for example, make it a habit to keep the P.M. backup in your briefcase and take that disk home with you at night. That way, if you come into work one day and find your PC and disks stolen or damaged, you're still in business.

necessity of making backup copies. For some tips on doing that, see the box on page 54.

## WHAT'S THE PASSWORD?

Recent versions of *1-2-3* and *Symphony* allow you to assign a password to a spreadsheet file in order to prevent unauthorized access. When you save a file with a password, *1-2-3* and *Symphony* use the contents of that password as a key to encrypt the records within the file structure. To decrypt that file, *1-2-3* and *Symphony* need the password.

While password protection can be a very valuable feature, it can also cause problems. When you try to retrieve or combine a password-protected file, you are prompted to enter the password. If you don't know it or can't remember it, you cannot retrieve the file.

There are products that are able to recover a worksheet's password. Although Lotus Development Corp. has not made the information public, some third-party utility manufacturers have performed some reverse-engineering and figured out the password-protection scheme. These utilities analyze the contents of the encrypted file and can, in most cases, determine the password. Once you know the password, you have all the information you need to access the spreadsheet. Two products that help reveal forgotten or lost passwords are *Password* and *Rescue Plus*.

The existence of such utilities is not all good news, however. If you can use a program to reveal the password of a file, so can someone else. So if your spreadsheets are sensitive, do not rely on only a password.

▲ IF YOU DON'T KNOW THE PASSWORD, YOU CAN'T GAIN ACCESS TO THE FILE.

Finally, maybe your password just doesn't work. Remember that *1-2-3* and *Symphony* passwords are case-sensitive. That means that *TEST* and *test* are different passwords. If you have trouble retrieving a password-protected file and think you know the correct password, enter the same letters in a different case before you reach for that utility.

The list prices of the utilities mentioned in this article range from $20 to $150. When you compare those figures with the value you place on your time, you may want to consider building your own library of utilities. Since these programs may not be readily available at your computer store, you may need to special-order them or purchase them by mail. ■

**IN BRIEF**

*Mace Utilities 5* and *Mace Gold*. Paul Mace Software, 400 Williamson Way, Ashland, OR 97520; 800-523-0258, in Oreg. 503-488-2322. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires 256K of RAM, DOS 2.0 and higher, and one floppy-disk drive. Released 11/88. $99 for *Mace Utilities 5*, $149 for *Mace Gold*. No warranty.

*Password*. Vericomp, P.O. Box 23360, San Diego, CA 92123; 619-277-0400 or 800-876-0400. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher. Released 9/87. $19.95. Money-back guarantee.

*PC Tools* Deluxe Version 5.5. Central Point Software, 15220 Northwest Greenbrier Pkwy., 200, Beaverton, OR 97006; 503-690-8090. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 3.0 or higher. A hard disk is recommended. Released 6/89. $129.

*Rescue Plus* Version 1.1. Spectrum Computer Services, 42 Weston St., Waltham, MA 02154; 800-541-4370, in Mass. 617-891-1450. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires 256K of RAM and DOS 2.0 or higher. Works with all versions of *1-2-3* and *Symphony*. Released 1/89. $119.95. 30-day, money-back guarantee. (For a review of this product, see the April issue.)

*The Norton Utilities* Advanced Edition Version 4.5. Peter Norton Computing, 100 Wilshire Blvd., Suite 900, Santa Monica, CA 90401; 800-365-1010. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires 196K of RAM, DOS 2.0 or higher, and one floppy-disk drive. Released 10/88. $150. Unlimited warranty against defective disks. (For a review of this product, see the April issue.)

*Disk Optimizer* Version 4.0 (includes *Data Guardian* 4.0 data-protection system). SoftLogic Solutions, One Perimeter Rd., Manchester, NH 03103; 800-272-9900, in N.H. and outside continental U S. 603-627-9900. Runs on the IBM PC, PC XT, PC AT, and compatible computers. Requires DOS 2.0 or higher. Works with all versions of *1-2-3* except Release 3 and all versions of *Symphony*. Released 9/88. $69.95. Upgrades $22.50 when purchased directly from company. 60-day, defective-disk warranty; 30-day, money-back guarantee if purchased directly from company

# Do they call it a h
# it's so hard to find wh

```
PLAN1     DOC     3803   9-18-88    3:36p
PLAN2     DOC     2779  11-19-88    6:01p
PLAN2B    DOC     2880  11-19-88    6:23p
DIVPLAN   DOC    56227  11-20-88   10:12a
MYPLAN    DOC    14656  12-04-88    1:30p
BILLING   DOC     3766  12-10-88   10:09a
BUDPLAN   DOC    27864  12-14-88   12:29p
QTLYSALE  DOC     9076  12-18-88    1:41p
QTLYSALS  DOC    11367  12-18-88   10:23a
PROJECT1  DOC    12675   1-04-89    9:15a
PROPOSAL  DOC     9356   1-06-89    8:33a
CREDIT1   DOC    31089   1-10-89   11:12a
CREDIT2   DOC    30980   1-10-89    2:35p
CREDIT3   DOC    19788   1-12-89    9:45a
89FORCST  DOC    22385   1-16-89   12:01a
89FORCS2  DOC    22499   1-17-89    9:05a
2NDHALF   DOC    12345   1-23-89    3:45p
MKTPLAN1  DOC     1291   1-24-89   10:42a
MKTPLAN2  DOC     1306   1-24-89   11:14a
FACTSHET  DOC     5284   1-26-89    9:15a
SCHEDULE  DOC     7869   1-30-89   12:33p
        69 File(s)   1650688 bytes free

C:\MS\MYDOCS>
```

You're looking for a specific piece of information on your PC. But you can't remember which memo, spreadsheet or even which file it's contained in.

And you're certainly not about to search through each directory, much less load and unload every file to find it.

That's why we created Magellan.® The first utility that helps you find your files by letting you instantly see their contents as

---

[1] Applications supported in SpeedView include Lotus 1-2-3, Symphony®, Manuscript®, Agenda®, WordPerfect, dBase®, MultiMate®, Microsoft® Word, WordStar®, DisplayWrite, all ASCII files, plus many more

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# ard disk because at you're looking for?

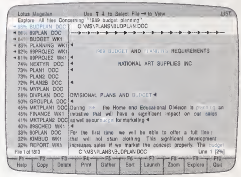
they appear in your favorite applications.

Without even having to load the specific applications that created the file.

With Magellan, all you need is a general idea of what you're looking for.

Because unlike other programs, the Magellan Explore function can perform a search on a phrase, a topic, an idea or even an entire file. Not just key words.

Then it lists your "found" files on the left of your screen in order of how relevant the contents are to the search topic.



```
Lotus Magellan          Use ↑ ↓ to Select File → to View                 LIST
 Explore  All files Concerning ''1989 budget planning'
→ 88% BUDPLAN  DOC |  C \MS\PLANS\BUDPLAN.DOC
→ 86% 89PLAN  DOC  | —→—→—→—→—→—→—→—→—→—→—→—→—→—→—→—
→ 84% BUDGET  WK1  |
→ 83% PLANNING  WK1|◄
→ 82% 89PROJEC  WK1|        1989 BUDGET AND PLANNING REQUIREMENTS
→ 81% 89PROJE2  WK1|◄
  74% NEXTYR  DOC  |◄              NATIONAL ART SUPPLIES INC
  73% PLAN1  DOC   |◄
  73% PLAN2  DOC   |
  72% PLAN2B  DOC  |◄
  71% MYPLAN  DOC  |
  58% DIVPLAN  DOC |DIVISIONAL PLANS AND BUDGET◄
  50% GROUPLA  DOC |◄
  45% MKTPLAN1 DOC |During [illegible]  the Home end Educational Divison is planning an
  45% FINANCE  WK1 |initiative that will have a significent impact on our sales
  41% MKTPLAN2 DOC |as well as our budget for marketing◄
  40% 89SCHED  WK1 |◄
  33% 90PLAN  DOC  |For the first time  we will be able to offer a full line
  32% KIMBUD  WK1  |that will not stain clothing  This significant development
  32% REPORT  WK1  |increases sales if we market the concept properly. The budget
 File 1 of 1813    |    C \MS\PLANS\BUDPLAN DOC                        Line 1 [2%]
```

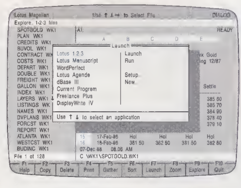
*The Magellan Explore and SpeedView functions let you locate everything related to a particular topic and see it as it would appear in its native application.*

As fast as you can scroll down this list, the Magellan SpeedView function instantly displays the complete contents of each file on the right of your screen, highlighting the relevant text for you.

Using the information is easiest of all. Because all it takes is one keystroke to launch into the application that created the file, and it'll be loaded and ready to go.

Or you could use Magellan to gather the information you choose from several different applications (like a 1-2-3® spreadsheet and a WordPerfect® memo)[1] and put it into a single file so you can start using it right away.

Best of all, you're productive literally five minutes after installing Magellan. The menus are intuitive, and everything you need to run the program is on the screen right in front of you. Which means that there is virtually no learning curve.



```
Lotus Magellan          Use ↑ ↓ → to Select File                    DIALOG
Explore: 1-2-3 files
  SPOTGOLD  WK1   |A1:                                                READY
  PLAN  WK1       |
  CREDITS  WK1    |         A        B        C        D        E
  BUVOL  WK1   ══════════════ Launch ════════════
  CONTRACT  WK  | Lotus 1 2 3           | Launch        rk Gold
  COSTS  WK1    | Lotus Manuscript      | Run           ing 12/87
  DEPART  WK1   | WordPerfect           |
  DOUBLE  WK1   | Lotus Agenda          | Setup
  FREIGHT  WK1  | dBase III             | New
  GALLON  WK1   | Current Program       |               Settle
  INDEX  WK1    | Freelance Plus        |               ------
  LAYERS  WK1 ↓ | DisplayWrite IV       |               385 60
  LISTINGS  WK  |                                       385 70
  NAMES  WK1    | Use ↑ ↓ to select an application      384 90
  DVPLANS  WK1  |                                       378 40
  FORCST  WK1                                           379 10
  REPORT  WK1
  ATLANTA  WK1    | 15     17-Feb-86     Hol        Hol        Hol        Hol
  WESTCST  WK1    | 16     18-Feb-86     381 50     382 50     381 50     382 80
  BUDINC  WK1     | 07-Dec 88    08.06 AM
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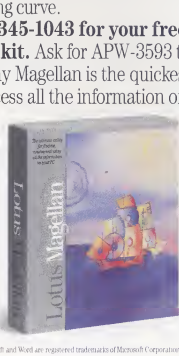

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# *SQL, Client-Server, and All That*

Clearing up the confusion about the next big change in database management

ILLUSTRATIONS BY DAVID K. SHELDON

BY LINDSY VAN GELDER

Databases, the lifeblood of every business, are undergoing radical change. New computer technology has opened up all kinds of possibilities and questions regarding the storage, access, and use of company information. Most of the excitement revolves around so-called back-end SQL database engines, which allow individuals to select and receive small chunks of data tailored to specific requests.

Although the smoke—or rather, the vapor—around PC-based SQL database products is finally beginning to clear, the state of the market can still be summed up in a word: confusion.

One symbolic and telling detail is that people in the computer industry haven't even agreed on how to pronounce SQL, the new buzz-phrase. Some say "ess cue el," the letters standing for Structured Query Language. Others say "sequel." Still others are waiting for the name game, like everything else in the SQL server wars, to shake out.

There is also some bewilderment about the definitions of the SQL products variously termed database engines, back ends, servers, clients, and front ends. Says one software executive: "I've settled on 'client-server architecture.' That doesn't offend anyone."

But substantive questions about SQL server products remain. What is a client-server setup, and what types of businesses need one? What is the productivity payoff? How much of an investment is involved? What products promise the best performance and the best guarantees of future compatibility? And which of the vendors that have leaped on the crowded SQL bandwagon are going to emerge as the winners?

## THE CLIENT-SERVER APPROACH

Traditionally, corporate databases have been stored on central file servers connected to individual PCs over a local area network (LAN). Under this arrangement, the file server must download the entire database program whenever a network PC requests even a small amount of data. On a busy network, the result is often a bottleneck or even a crash.

Under client-server architecture, however, database functions are split in two. The "back end," or "engine," is the file server itself, which houses the database. Unlike a storage-only file server, a database server has a hefty amount of processing power of its own, which it uses to store, search, sort, retrieve, and manage data. When users query the server through the "front end," instead of downloading the entire database, the server sends back only the requested data.

The front end, also known as the "client" or "requestor," is the PC software, which might be a spreadsheet or a word-processing program. Most major software companies, including Lotus Development Corp., are working on new versions of their applications that will be able to query an SQL database and pull the data directly into the application.

A front-end program translates a query into SQL before routing it to the back end. Although most front ends are still in development, their manufacturers are promising software with interfaces consisting of familiar menus and prompts. (For Lotus's front-end plans, see "The Lotus Strategy: Connect *1-2-3* to SQL Databases" on page 60.)

You can think of SQL as the glue that holds the front ends and back ends together (see "A Short History of SQL" on page 62). It is a language specifically designed for working with relational databases, those databases that let you access more than one file at a time. SQL solutions have been around in the mini and mainframe worlds for years, but they required users to program with arcane and difficult-to-master SQL commands. What's new and exciting is the upcoming marriage of SQL programming power to the ease of use to which PC users are accustomed.

The division of labor in the client-server approach means that more than one user at a time can read and write to the same database with no deterioration in performance. For example, SQL Server, the Ashton-Tate/Microsoft product, running on an 80386-based computer with at least 8 megabytes of RAM and a 300-megabyte database will manage the queries of more than 35 users, with a response time of less than a second.

In addition to faster, more accurate database searches, client-server architecture offers better security and data integrity. For example, if the system fails, there is a much better chance of recovering data, since all data resides on the server and "speaks" the lingua franca of SQL. And the software gives much greater control over who has clearance to access what data.

## THE CROWDED SQL BANDWAGON

As corporations start to think about replacing their traditional database systems, there is a mad scramble by software companies to come out with back-end SQL server engines and front-end applications. The list of software developers churning out SQL products reads like a *Who's Who* of microcomputing: Microsoft Corp., IBM, Borland International, Lotus Development Corp., Oracle Corp., Novell, Ashton-Tate, and Microrim, to name a few. Their motivation is clear. Edward M. Esber Jr., chairman and CEO of Ashton-Tate, has been quoted as saying that "whoever owns the database server owns office automation for the next decade."

In the grab for market share, some companies seem to be competing with themselves by creating front-end software for a competitor's server, or vice versa. Most have

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*Lindsy Van Gelder is a free-lance writer based in New York City.*

spent the past two years assaying each other like medieval warlords, forging an array of unlikely, shifting, and contradictory alliances in the hope of advancing their kingdoms.

In addition to the question of what kinds of products will emerge from these software developer alliances, there is the fundamental question: Who needs this client-server architecture? Data-intensive businesses like banks and very competitive businesses, such as giant retailers and mail-order houses, are natural customers. These big corporations have for years used PCs for stand-alone applications, but have stored their major databases on minis and mainframes. This group is beginning to view the client-server approach as the solution to the problem of getting micros and mainframes to talk to each other.

Right now, there are more people shopping than there are people buying. But analysts predict that once the technology is proven reliable, all that will change, and sales will surge. Within three years, they say, client-server architecture will be widespread in Fortune 500 companies.

Smaller businesses may have a harder time justifying the upgrade. These engines offer a tremendous "power advantage," which will become more apparent as the front ends become available, says New York consultant William Claiborne, who specializes in small database-management systems. "But you have to ask yourself how often you *need* six people accessing information at the same time."

Investing in client-server architecture isn't cheap. First there's the cost of the back-end engine. Oracle's back end, for example, will cost $2,499 for OS/2 and more for the Unix operating system. SQL Server costs $2,495 for OS/2. In addition to the back end, you'll have the expense of local and wide-area networks, memory-rich, 80386-based file servers, front-end applications, and employee training.

Several companies are offering lighter-weight back-end SQL engines that run under DOS, but few software ven-

## THE LOTUS STRATEGY: CONNECT 1-2-3 TO SQL DATABASES

In early 1988 Lotus Development Corp. announced with some fanfare that it would join with Gupta Technologies, makers of the SQLBase database server, to bring out a server especially optimized for use with Lotus software. The announcement was widely regarded as yet another skirmish in the ongoing war between Lotus and its archrival Microsoft, whose SQL Server might otherwise be the platform of choice for *1-2-3* users. Then the world waited. And waited.

Now it seems that Lotus has changed direction. "We've learned a lot about client-server architecture and SQL engines [from our association with Gupta]," says Thomas Smaldone, Lotus marketing director for database systems, "but we're not going to be distributing a database server ourselves. We're going to be focusing our business on front-end tools." Indeed, *1-2-3* Release 3 will be supporting SQL Server, as well as Oracle's and other servers.

If Lotus's new strategy is a tacit acknowledgment that the back-end market is already saturated, it's also a recognition that the front-end market is still wide open, especially where products other than databases are concerned.

Lotus's Smaldone stresses that spreadsheets and databases are logical extensions of each other. Nearly 20% of Lotus users are now using *1-2-3* primarily as a database, he says. "And something like 70% of the data that goes into spreadsheets is retyped," adds Christine M. O'Connor, general manager of Lotus's Systems Technology Group. "Even sophisticated corporations will print out their general ledger material and then pay people to rekey it," she says. "People like [and trust this method] because they understand how it works: You call Arlene and have her type it. They don't understand modems. They understand Arlene."

Lotus is working primarily on connectivity to databases. And contrary to its earlier stance, the company is now promising a completely open architecture. Lotus plans to license its DataLens technology—the interface between *1-2-3* Release 3 and external data—to any vendor who wants to hook up a back-end server to Release 3. A year from now, says O'Connor, there will be DataLenses between Release 3 and virtually every database server on the market. Release 3 itself includes a Lotus-developed DataLens driver for access to *dBase III* files.

But the company's bread-and-butter front ends will be *1-2-3/G*, a graphical version of *1-2-3* designed to run under Presentation Manager, and Lotus/DBMS. The latter isn't a database per se, but rather a graphical toolkit for accessing, sorting, and manipulating data from a database server or wherever it happens to reside.

"In the future," says Smaldone, "we expect that the combination of Lotus/DBMS and *1-2-3/G* will meet companies' needs in the areas of both spreadsheet and database."

The two products will have a common user interface, and although they can be used as stand-alone products, Lotus is hoping people will buy them both. Using them in concert, you might call up a graphical reproduction of a 1040 form, search a database for a list of clients and the relevant financial information about each one, look at the information in chart form, ask the database for more information about a particular figure, do calculations based on the results, and print out a complete 1040 for each client.

No release dates have been set. *—L. V. G.*

IN THE GRAB FOR MARKET SHARE,
SOME COMPANIES SEEM TO BE COMPETING WITH THEMSELVES.

dors are supporting these with front-end application products. The best-supported DOS back end may be Novell's NetWareSQL, which incorporates most of its Btrieve file-management system. NetWareSQL costs only $595 and will have front ends from Lotus, Borland, Nantucket Corp., Fox Software, and several other software companies. But the Novell server isn't as capable as, for example, Oracle's server for OS/2. "[Oracle's product] provides connectivity that we can't provide at this time," admits Novell spokesman Dwight Davis. "The people we'd like to target right now are the ones who don't need all of Oracle's connectivity or can't afford it."

## HEAT FROM THE FRONT LINE

Because the technology is new and complex, every vendor's SQL product—or promise of products—has come under fire from some quarter. For example, according to analyst/programmer Thomas Reardon, of Duke University Medical Center in North Carolina: "What's available is not much, and what's coming is too much to be true."

One early SQL adopter, Ken Shapiro, vice president of Citibank in New York, chose Gupta Technologies' SQLBase back end. In the middle of 1988, when Shapiro was looking, it was the only viable player in the field. "We couldn't wait around for Presentation Manager and all the servers supporting it," says Shapiro. "Business goes on."

Today, the field is larger. At least a dozen companies—including small firms like XDB Systems and Via Information Systems Corp. and better-known companies such as Microrim—have released or announced server products. But most analysts agree that they may be either too little or too late to penetrate corporate America in a big way. Three major contenders have emerged for that market: IBM, Oracle, and the Ashton-Tate/Microsoft alliance.

Part of the reason is sheer size. "The single most decisive factor will be distribution channels," predicts analyst Michael Braude, vice president of the Gartner Group, a market research firm in Stamford, Conn. "That's why Gupta is a long shot."

In recent months, the server wars have taken an especially hawkish turn. Gupta Technologies took out full-page ads proclaiming, "We invented the SQL database server." At Oracle's official introduction of its server product, president Lawrence J. Ellison trashed IBM and called the Ashton-Tate/Microsoft server "Stalinist" because it supports only one operating system and a limited number of hardware platforms. Novell says its front end and back end offer the tightest possible integration when used together. Ashton-Tate says the same for *dBase*.

The question of which one of the three major servers a company chooses may prove to be partly a function of the products the company already has installed. "If you have Oracle databases on other platforms, you're going to be looking at Oracle," says Bill Higgs, vice president of software research at InfoCorp (Santa Clara, Calif.). "If you're a True Blue shop, you're probably going to go with IBM."

Steve Davies, a programmer with Patterson Dental Co., a large dental-supply firm in Minneapolis, is working with a vice president of his company to decide on a server. The vice president "has a mainframe background and is very IBM-oriented," says Davies. So while Davies prefers SQL Server, he suspects he'll be overruled.

The IBM database server, still unreleased, is a multiuser version of its OS/2 Extended Edition Database Manager. Few analysts recommend it for any reason other than single-supplier convenience. Oracle's database server is scheduled to be released in October and promises to work with a vast array of networks, operating systems, and

DAVID K SHELDON

hardware platforms including the Apple Macintosh.

But some observers wonder whether Oracle can deliver on its promises. "Even if Oracle really were supporting the 50 platforms it says it is, what kind of optimization could it deliver to each?" asks analyst Richard Finkelstein, president of Performance Computing, a consulting firm that specializes in relational database management systems. "IBM, with all its resources, is supporting only four."

Oracle's marketing is aggressive, however, and versions of its database-management program are well entrenched in corporate America. "They sure seem to own the mini world," says Mark Whiteside, vice president of sales and marketing for Nantucket Corp., makers of *Clipper*, a database-development program. "I keep getting calls from corporate clients who say, 'We're a *Clipper* shop on the PC, and Oracle is pushing us to commit to a total Oracle solution.' " If the pressure continues, Whiteside admits, Nantucket—which now supports the Ashton-Tate/Microsoft, IBM, Gupta, and Novell servers—will have to support Oracle as well.

## THERE ARE STANDARDS AND STANDARDS

Except for its competition, virtually everyone in the industry gives the technical edge to SQL Server. Unlike Oracle, which conforms to the SQL standard defined by the American National Standards Institute (ANSI), SQL Server incorporates "extensions" of the language, such as stored procedures. These are macrolike compiled programs that define commonly used transactions and that execute in a fraction of the time it takes to input ordinary commands. But probably the flashiest features are "triggers," a type of stored procedure. A trigger, activated on the command to insert, delete, or update, instantly fires off watchdog programs to make sure that the operation doesn't violate the rules of the database.

Edward Oates, Oracle's vice president of desktop products, says that Oracle is developing its own stored procedures and will include them in the next version of Oracle. Triggers remain outside the ANSI standard, however, and Oates warns that those who invest in the SQL Server procedures might be left out in the cold in the future, should ANSI—or a company like IBM—define a different standard.

"[Oracle's] database technology is basically left over from the '70s," responds Ashton-Tate's Pamela Goldschmidt. "And now they have to come up with a marketing reason to explain why SQL Server has fancy features they don't have."

While the back-end server battle heats up, the front-end action is just beginning. Aside from the question of which back end to support, front-end vendors are realizing that their products will have to change fundamentally as a result of client-server architecture. Programs can be smaller, but they face new technical challenges, such as accessing data stored across multiple servers.

They will also have to be friendlier, and some vendors welcome what they say will be a new freedom to be creative. *Clipper* developers, notes Nantucket's Whiteside, like building user products. "Designing the data structures and all that stuff is grunt work," he says, "and that's the stuff that's now going to be taken care of on the server side. Designing the interface is the sexy part." ■

### A SHORT HISTORY OF SQL

In 1970 IBM Research Fellow E. F. Codd published a paper, "A Relational Model of Data for Large Shared Data Banks." It outlined a set of mathematical principles that laid the foundation for the products we now call relational databases. Structured Query Language (SQL) was just one of several languages subsequently designed to work with Codd's relational model.

What set SQL apart was its embrace by IBM, that perennial setter of de facto standards. What makes SQL special today isn't something magical in its capabilities, but the fact that, like the ASCII format for text and the MIDI format for music, everybody has agreed to use it.

Within SQL, though, there are versions, dialects, and extensions. In 1986 the American National Standards Institute (ANSI) approved a standard relational language that incorporated most of the IBM dialect. "However, there are at least 100 different dialects," says Codd's associate, C. J. Date, author of *A Guide to the SQL Standard* (Addison Wesley, 1989). "So it's by no means trivial to get two systems to talk to one another, even if they're both alleged to be SQL systems."

Furthermore, Date says, the official ANSI version is very weak, which means that for most applications, programmers have to go beyond the boundaries of the standard and thus run the risk of not being compatible. The industry will eventually work out the kinks, predicts Date, "but it's going to be a lot more painful than the vendors would have you believe, and it'll take a lot longer."

Another worm in this can is that many database programs, regardless of their other merits, don't adhere to Codd's original mathematical principles defining the relational model. For table-oriented programs, such as *Paradox* and *DataEase*, migrating into the SQL world should be relatively straightforward. For record-oriented programs like *dBase*, however, the technical challenges are more formidable. Ashton-Tate hopes to meet those challenges in *dBase IV* 1.1 by using "triggers"—a kind of stored procedure—in SQL Server to maintain data integrity. Meanwhile, *dBase IV* 1.0, whose command-driven SQL mode is awkward and often unworkable, hasn't inspired user confidence in the company's ability to mix algorithmic apples and oranges.

*—L. V. G.*

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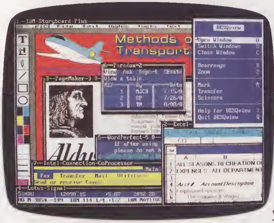

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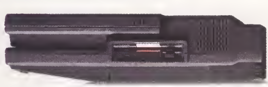

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PhoenixPage

CIRCLE 110 ON READER SERVICE CARD

# A Premium Analyzer for WORKER'S COMP

## Determine if your company's insurance premiums for Worker's Compensation are correct.

BY NORMAN L. GOODMAN

If you are a corporate finance officer with Worker's Compensation responsibilities, you know that your insurance carrier uses an experience modification factor to measure the frequency and severity of your company's claims. This factor adjusts insurance rates to reflect your company's claim history. A company with many claims will have a high experience modification factor and high Worker's Compensation premiums. A company with few claims will have a lower factor and lower rates.

Until now, you've had no way of knowing whether the experience modification factor used by your insurance company accurately reflects your organization's history of Worker's Compensation claims. The worksheet described here eliminates the mystery.

Provided that your company does not fulfill payroll in Pennsylvania, New Jersey, or Delaware, where different procedures apply, you can use this worksheet to calculate the experience modification factor that applies to your company. The worksheet operates in all versions of *1-2-3* and *Symphony*. Instructions for building it appear in the box on page 70.

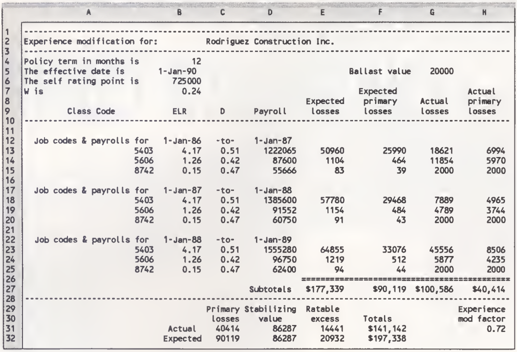
You might wonder if the time it takes to build the worksheet is justifiable. The answer is: Yes, because there are several ways an experience modification calculation can go awry. For example, your insurer might not credit your company for subrogation recoveries. These are funds an insurer recovers because of a third party's negligence. Your insurance company might include claim-adjustment expenses, such as attorneys fees, in the experience modification factor calculation. Or your insurance carrier might even be charging your company for another firm's claims. The worksheet will alert you to these errors by returning a modification factor that is different from the factor calculated by your insurer.

Building the worksheet provides additional benefits. It

---

*Norman L Goodman is a Worker's Compensation consultant. His speciality is premium analysis for large companies.*

CHRIS SPOLLEN



```
                A                  B        C         D          E           F          G          H
1  ----------------------------------------------------------------------------------------------------
2  Experience modification for:          Rodriguez Construction Inc.
3  ----------------------------------------------------------------------------------------------------
4  Policy term in months is           12
5  The effective date is        1-Jan-90                               Ballast value   20000
6  The self rating point is       725000
7  W is                             0.24                                Expected              Actual
8                                                            Expected   primary    Actual    primary
9           Class Code            ELR      D      Payroll    losses     losses     losses    losses
10 ----------------------------------------------------------------------------------------------------
11
12   Job codes & payrolls for   1-Jan-86   -to-    1-Jan-87
13                        5403      4.17    0.51     1222065     50960        25990    18621       6994
14                        5606      1.26    0.42       87600      1104          464    11854       5970
15                        8742      0.15    0.47       55666        83           39     2000       2000
16
17   Job codes & payrolls for   1-Jan-87   -to-    1-Jan-88
18                        5403      4.17    0.51     1385600     57780        29468     7889       4965
19                        5606      1.26    0.42       91552      1154          484     4789       3744
20                        8742      0.15    0.47       60750        91           43     2000       2000
21
22   Job codes & payrolls for   1-Jan-88   -to-    1-Jan-89
23                        5403      4.17    0.51     1555280     64855        33076    45556       8506
24                        5606      1.26    0.42       96750      1219          512     5877       4235
25                        8742      0.15    0.47       62400        94           44     2000       2000
26                                                           ==========================================
27                                                Subtotals  $177,339      $90,119 $100,586    $40,414
28 ----------------------------------------------------------------------------------------------------
29                                       Primary Stabilizing  Ratable                        Experience
30                                        losses    value      excess     Totals             mod factor
31                               Actual    40414       86287     14441     $141,142                0.72
32                              Expected   90119       86287     20932     $197,338
```

**This worksheet calculates the experience modification factor for Worker's Compensation insurance. Insurers use this factor to determine corporate insurance rates. Rows 1 through 6 collect data. A weighting factor, W, is calculated in cell B7. Job-code and payroll data are entered in rows 12 through 25. The experience modification factor is calculated in cell H31.**

allows you to budget for future Worker's Compensation premiums. You can calculate your company's experience modification factor long before the factor becomes effective. Once you know this number, you merely multiply your state Worker's Compensation rate, which is based on your payroll forecast, by the calculated modification factor. The result is a forecast of your premium.

The worksheet also allows you to determine the effect on premiums of paying small claims directly rather than submitting them to the insurer. Be sure that this practice is permitted in your state. If so, by removing all claims under $2,000 from the worksheet, you can calculate an alternate experience modification factor. You can then use this alternate factor to calculate compensation premiums. By comparing this premium with a premium that incorporates small claims in its calculation, you can determine if your company saves money by settling small claims directly.

## THE DATA YOU NEED

Before you can use the worksheet shown in the figure, you must gather some data, most of which is available from your insurance carrier. The experience modification calculation is based on your firm's payrolls and Worker's Compensation claims for three consecutive years. Normally, this time period begins four years and ends one year before the factor becomes effective. For example, a modification factor that becomes effective on January 1, 1990, is based on claims and audited payrolls for the years January 1, 1986, to January 1, 1987; January 1, 1987, to January 1, 1988; and January 1, 1988, to January 1, 1989. Dates run from January 1 to January 1 because that is the way most insurance carriers write their policies.

Your insurance company audits your firm's payroll annually. Audits are normally completed within a month or two after a policy expires. In our example, three years of audited payroll and claim data appear in rows 12 through 25 of the worksheet.

You also need a claim history for the same period of time. When an employee is injured, the insurer attempts to determine the entire cost of the accident. If the injury is minor and consists of a short-term medical expense, such as the cost of setting a broken bone, it is easy to figure the final cost. If the injury is more serious and involves time away from work or a permanent disability, the insurer's initial guess at the total expense may be inaccurate.

Insurance companies also frequently update their assessment of a claim's cost to account for inflation, increased benefit levels, and other changing circumstances. Because the estimated cost of a claim fluctuates, a claim's cost must be valued at some point in time.

The experience modification calculation is usually based on the estimated cost of a claim six months prior to the modifier's effective date. For example, an experience modification factor that becomes effective on January 1, 1990, is based on a claim valuation as of July 1, 1989.

Payroll-audit and claim-cost information are easy to obtain. Every insurer files this data annually in a Unit Statistical Report. To use the worksheet, you will need either a copy of the Unit Statistical Report or three years of individual payroll audits and claims costs. If you use three years of claim-cost data, make sure that the claims are valued six months prior to the modifier's effective date.

You will also need two additional pieces of data for each job code. The first is the expected loss rate, referred to in column B of the worksheet as ELR. The ELR is a factor that approximates the losses that can be expected for a job code, based on the size of the payroll. The second is the discount ratio, referred to in column C of the worksheet as D. D is a value that helps to determine the amount of expected primary losses. You can obtain this data from your insurance company or from your state Worker's Compensation Rating Bureau.

The last piece of data you'll need is a number called the self-rating point (SRP). You calculate this number by multiplying by 10 your state's single-claim accident limitation. Your insurance carrier or state rating bureau can provide your state's single-claim limitation number.

## ABOUT THE WORKSHEET

The worksheet has several sections. Ranges A1..B6 and G5..G25 collect input. A weighting factor, W, which is used in various worksheet calculations, is calculated in cell B7. We'll discuss W later in this article.

Rows 12 through 27 collect job codes, payroll data, and dollar-loss data. Each four-digit code in column A represents a job category, such as office worker, carpenter, and so on. The main function of job codes is to allow jobs to be differentiated in terms of risk. For each job category in an organization, there is an associated job code, ELR value, D value, and payroll dollar amount.

Columns E through H contain data on dollar losses. Column E calculates expected dollar losses. These are the losses a company can expect to see, based on the payroll size of a particular job code.

Column F calculates expected primary losses in dollars. These are expected losses multiplied by the discount factors in column C.

You enter actual dollar losses in column G. These are the claims your company has experienced during a given payroll period. In your company's worksheet, the number of claims you list may be greater than or fewer than the number of job codes you entered in column A. There is no correlation between job codes and claims.

Column H calculates actual primary losses. These are actual loss values from column G when loss values are less than $2,001. If a claim is greater than or equal to $2,001, @IF formulas in column H return a different result. In this case, the actual losses are multiplied by 10,000, and the result is divided by actual losses plus 8,000. This adjusts actual primary-loss values for claim frequency.

The report section of the worksheet includes rows 29 through 32. It provides information on actual and expected losses, stabilizing values, and ratable excess values.

Actual and expected primary-loss values are taken from the subtotals calculated in row 27. The ratable excess values are calculated in cells E31 and E32 by multiplying W times actual and expected losses. A stabilizing value is calculated in cell D31. The formula in this cell incorporates a ballast value from cell G5. Known as B in the insurance trade, the ballast value stabilizes the modification factor from year to year. B ranges from 20,000 for small employers to 0 for the largest employers. In the state of California, B ranges from 10,000 to 0. You can obtain your company's ballast value from the rate pages for your state. Rate pages are available from the National Council on Compensation Insurance in New York City.

The experience modification factor is calculated in cell H31. This is the value you'll compare with your insurance company's calculations.

## ENTERING THE DATA

To use the worksheet, first enter an interval value in cell B4. This value represents the number of months of policy coverage. For a policy that runs a calendar year, enter 12. For a six-month policy, enter 6.

In cell B5 enter the effective date of the experience modification factor being calculated. If the modifier takes effect on the policy's effective date, use that date in cell B5. Otherwise, use the actual date the new modifier becomes effective, even though the date may overlap policy years. Enter the label *1-Jan-90* for a January 1, 1990 effective date.

Your company's self-rating point is in cell B6. The self-rating point is used to calculate W, the weighting factor. W adjusts the impact of severe claims, based on the expected losses in column E. Since expected losses are factored into the W calculation, in small companies the value of W places emphasis on the frequency of claims. In larger companies the value of W places emphasis on the severity of claims.

You must enter three years' worth of audited claim data in the worksheet. Depending on your company's claim history, you may need to use more rows than are shown in the figure. If that's the case, be sure to copy formulas down the worksheet as required.

For each job code for which there is a payroll amount, you must enter an ELR value in column B, a D value in column C, and a payroll value in column D. Be sure to list each job code for which there is an audited payroll amount on the insurer's payroll audit or Unit Statistical Report. In the example, there are three job codes: 5403, 5606, and 8742.

When entering claim amounts in column G, use whole dollars. A claim is defined as the sum of medical payments and indemnity, or lost time, payments. It does not matter if the amount has been paid or if the insurer has merely set up a reserve for future payments.

Normally, you must list each claim individually. You may, however, combine small claims into a single total, provided that their sum does not exceed $2,000. For example, if you have claims of $200, $300, and $400, you can enter them as $900 in a cell in column G.

Once you've entered three years' worth of data, worksheet formulas return a variety of loss values in columns

E, F, and H. The report section summarizes loss values, provides stabilizing and ratable excess values, and displays an experience modification factor based on your claim data.

## SOME GEOGRAPHICAL LIMITATIONS

You can use this template to calculate the experience modification factor for any state that has adopted the industry standard Experience Rating Plan. However, a few states deviate from this formula. Pennsylvania, New Jersey, and Delaware, for example, do not use the system described.

If your company is located in California, see the setup box for instructions on modifying worksheet formulas.

The worksheet is designed to calculate a single-state experience modification factor. If your company fulfills payroll in more than one state, you can use the worksheet to calculate an approximate multistate experience modification factor. The factor you calculate may not match exactly the multistate factor calculated by your insurer, but it will be quite close—usually within $^{3}/_{100}$ of a point. This is certainly accurate enough to allow you to forecast premiums.

To determine a multistate experience modification factor, average the individual state self-rating points for all the states in which your company fulfills payroll. Enter this number in cell B6. Then enter into the worksheet the payrolls, rates, and claims for all states. The worksheet will return an approximate multistate experience modification factor in cell H31. ■

## HOW TO SET UP THE CLAIMS-ANALYZER WORKSHEET

### 1. Default settings

**Format:** Fixed 0

*1-2-3*: /Worksheet Global Format Fixed, enter 0
*Symph:* MENU Settings Format Fixed, enter 0, Quit

**Label alignment:** Center

*1-2-3*: /Worksheet Global Label-Prefix Center
*Symph:* MENU Settings Label-Prefix Center Quit

### 2. Individual column widths

| Column | Width |
|---|---|
| A | 28 |
| B | 10 |
| C | 8 |
| D | 12 |
| E | 10 |
| F | 13 |
| G | 10 |
| H | 11 |

For example, to set the width of column A, position the cell pointer in column A, select

*1-2-3*: /Worksheet Column Set-Width, enter 28
*Symph:* MENU Width Set, enter 28

### 3. Cell formats

| Format | Range |
|---|---|
| Fixed 2 | B7, B13..C15, B18..B20, B23..B25, H31 |
| Currency 0 | E27..H27, F31..F32 |

For example, to set the format for cell B7, select

*1-2-3*: /Range Format Fixed, press Return to accept two decimal places, indicate range B7
*Symph:* MENU Format Fixed, press Return to accept two decimal places, indicate range B7.

### 4. Labels

Enter the labels shown in rows 1 through 12 of the figure. Cell A12 contains the label *Job codes & payrolls for*. Enter the dates that appear in rows 5, 12, 17, and 22 as labels. Copy the label in cell A12 to cells A17 and A22. Enter *^-to-* in cell C12. Copy the label in cell C12 to cells C17 and C22. Enter the label shown in cell D27 and in rows 28 through 32. To create dashed lines, enter \- or \=, then copy the cell, as necessary.

Left-align the labels in cell A2 and range A4..A7: For example, select /Range Label Left (*Symph:* MENU Range Label-Alignment Left) and specify cell A2.

### 5. Values

Enter the values shown in cells B4, B6, G5, and in range A13..C15. Copy the values in range A13..C15 to cell A18 and cell A23. Enter the values shown in ranges D13..D15, D18..D20, D23..D25, G13..G15, G18..G20, and G23..G25.

### 6. Range Names

| Name | Range |
|---|---|
| *srp* | B6 |
| *w* | B7 |
| *exploss* | E27 |

For example, to assign the range name *srp* to cell B6, press slash (*Symph:* MENU), select Range Name Create, enter *srp*, and indicate cell B6.

### 7. Enter and copy formulas

| Cell | Formula |
|---|---|
| B7 | @ROUND(@IF(($exploss)/($srp)<0,0,($exploss)/($srp)),2) |
| E13 | +D13/100*B13 |

Copy cell E13 to ranges E14..E15, E18..E20, E23..E25.

**F13** +E13*C13

Copy cell F13 to ranges F14..F15, F18..F20, F23..F25.

**H13** @INT(@IF(G13<2001,G13,G13*10000/(G13+8000)))

Copy cell H13 to ranges H14..H15, H18..H20, H23..H25.

**E27** @INT(@SUM(E13..E26))

Copy cell E27 to range F27..H27.

| Cell | Formula |
|---|---|
| C31 | +H27 |
| D31 | @INT((exploss−F27)*(1−W))+G5 |
| E31 | @INT((G27−H27)*$W) |
| F31 | @SUM(C31..E31) |
| C32 | +F27 |
| D32 | +D31 |
| E32 | @INT((exploss−F27)*W) |
| F32 | @SUM(C32..E32) |
| H31 | +F31/F32 |

To adapt the worksheet for use in California, edit the formulas in cells H13 and D31 as follows:

**H13** @INT(@IF(G13<2001,G13,G13*9000/(G13+7000)))

Copy cell H13 to ranges H14..H15, H18..H20, H23..H25.

**D31** @INT((exploss−F27+10000)*(1−W))

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# A COMPATIBILITY GUIDE

## These lists will help you determine if a model works in your release of *1-2-3* and *Symphony*.

BY CYNTHIA G. FITZGERALD

As announced in last month's Staff Letter, *LOTUS* is now focusing its support on *1-2-3* Release 2.01 and *Symphony* Release 2.0. That means that models presented in the magazine will be built in those two releases, with appropriate additional commentary for *1-2-3* Releases 2.2 and 3. We'll also begin to publish models that utilize the distinctive features of Release 3. We'll no longer explain how to adapt models for use in *1-2-3* Releases 1A and 2 and *Symphony* Releases 1/1.01, 1.1, and 1.2. And we'll no longer indicate in which early releases the model might work.

That doesn't mean that if you use an earlier release, you won't be able to use the models presented. It does mean that if you have one of the earlier releases of *1-2-3* or *Symphony*, you'll want to determine whether or not a model works in your release before you begin building it.

To help you with that task, we present here several lists of the functions, macro commands, and menu choices that *1-2-3* Release 2.01 contains but that Releases 1A and 2 do not contain, and those of *Symphony* Release 2.0 that Releases 1/1.01, 1.1, and 1.2 do not contain. Before you begin building one of our models using an early release, look through the instructions for building the model. If you see an unfamiliar function, macro command, or menu selection, check it against your release's list presented here. If the item appears on the list, your product does not contain the necessary functionality to do the job. If you're an intermediate or advanced user, you may be able to program a "work-around" that will allow you to use the model.

For now, the Q&A and Good Ideas sections will include techniques of interest to Release 1A users.

### *1-2-3* RELEASE 1A DOES NOT HAVE THESE:

**Menu Choices**

/Worksheet Global Format Date Time
/Worksheet Global Format Hidden
/Worksheet Global Default Printer Name
/Worksheet Global Default Other International (Punctuation, Currency, Date, Time)
/Worksheet Global Default Other Help (Instant, Removable)
/Worksheet Global Default Other Clock (Standard, International, None)
/Worksheet Global Zero
/Worksheet Column Hide
/Worksheet Column Display
/Worksheet Page
/Range Format Date Time
/Range Format Hidden
/Range Name Table
/Range Value
/Range Transpose
/File Erase Other
/File List Other
/Graph Options Scale Y-Scale Format Date Time
/Graph Options Scale Y-Scale Format Hidden
/Graph Options Scale Y-Scale Indicator
/Graph Options Scale X-Scale Format Date Time
/Graph Options Scale X-Scale Format Hidden
/Graph Options Scale X-Scale Indicator
/Data Matrix (Invert, Multiply)
/Data Regression (X-Range, Y-Range, Output-Range, Intercept, Reset, Go)
/Data Parse (Format-Line, Input-Column, Output-Range, Reset, Go)
/System

**Add-ins and Access to DOS**

No access to add-ins
Limited access to DOS through the File Manager

**Translate Options**

*1-2-3* Release 2/2.01
*dBase III*
*Jazz*
*Symphony* Releases 1/1.01, 1.1, 1.2

## *1-2-3* RELEASE 1A DOES NOT HAVE THESE:

*(continued)*

### @Functions

@@
@CELL
@CELLPOINTER
@CHAR
@CLEAN
@CODE
@COLS
@CTERM
@DATEVALUE
@DDB
@EXACT
@FIND
@HOUR
@INDEX
@ISNUMBER
@ISSTRING
@LEFT
@LENGTH
@LOWER
@MID
@MINUTE
@N
@NOW
@PROPER
@RATE
@REPEAT
@REPLACE
@RIGHT
@ROWS
@S
@SECOND
@SLN
@STRING
@SYD
@TERM
@TIME
@TIMEVALUE
@TRIM
@UPPER
@VALUE

### Macro Keywords

{BEEP}
{BIGLEFT}
{BIGRIGHT}
{BLANK}
{BRANCH}
{BREAKOFF}
{BREAKON}
{CLOSE}
{CONTENTS}
{DEFINE}
{DISPATCH}
{FILESIZE}
{FOR}
{FORBREAK}
{GET}
{GETLABEL}
{GETNUMBER}
{GETPOS}
{IF}
{INDICATE}
{LET}
{LOOK}
{MENUBRANCH}
{MENUCALL}
{ONERROR}
{OPEN}
{PANELOFF}
{PANELON}
{PUT}
{QUIT}
{READ}
{READLN}
{RECALC}
{RECALCCOL}
{RESTART}
{RETURN}
{*ROUTINE-NAME*}
{SETPOS}
{WAIT}
{WINDOWSOFF}
{WINDOWSON}
{WRITE}
{WRITELN}
{~}
{{}
{}}

## *1-2-3* RELEASE 2 DOES NOT HAVE THESE:

### Additional Features

In *1-2-3* Release 2 a label does not have a value of 0. Therefore, a calculation referring to a cell containing a label returns ERR. In some cases, a calculation referring to a range containing a label returns ERR.

### Translate Options

*1-2-3* Release 2.01
*Symphony* Release 1.2

## *Symphony* 1/1.01 DOES NOT HAVE THESE:

### Menu Choices

#### SERVICES Menu

SERVICES File Erase Macro-Library
SERVICES File List Macro-Library
SERVICES Configuration Printer Name
SERVICES Configuration Document Hard-Tabs (No, Yes)
SERVICES Configuration Other International Negative (Parentheses, Minus)

#### SHEET Window

MENU Width Hide
MENU Width Display
MENU Settings Recalculation Order Optimal
MENU Settings Zero (No, Yes)

#### COMM Window

MENU Settings Interface Comm Port (COM1, COM2)
MENU Settings Send Format (No, Yes)

#### FORM Window

MENU Field (Insert, Delete, Move)

#### PrintGraph

Settings Hardware Size-Paper (Length, Width)

#### Add-ins

INPUT.APP
MACROMGR.APP
NETFILE.APP
OUTLINER.APP*
SPELLER.APP
STAT.APP*
VT100.APP

*You can use the *Symphony* Release 2.0 version of the add-in, but it was not provided with Release 1/1.01.

#### Translate Options

*1-2-3* Releases 1A and 2/2.01
*dBase III*
DCA RFT format
*Jazz*
*Multiplan* SYLK file
*Symphony* Releases 1.1, 1.2, 2.0

#### @Functions

@CTERM
@DDB
@RATE
@SLN
@TERM

#### Macro Keywords

{CLOSE}
{DISPATCH}
{FILESIZE}
{FORBREAK}
{GETPOS}
{OPEN}
{READ}
{READLN}
{RESTART}
{SETPOS}
{WRITE}
{WRITELN}
{~}
{{}
{}}

#### DOC Macro Keywords

{AUTO}
{CASE}
{COPY}
{DLEFT}
{DLINE}
{DRIGHT}
{DWORD}
{FORMAT}
{MOVE}
{NEXTPAGE}
{PAGE}
{PASTE}
{REPLACE}
{SEARCH}
{TOPPAGE}

## *Symphony* 1.1 DOES NOT HAVE THESE:

### Menu Choices

**SERVICES Menu**

SERVICES File Erase Other Macro-Library
SERVICES File List Other Macro-Library
SERVICES Configuration Document Hard-Tabs (No, Yes)
SERVICES Configuration Other International Negative (Parentheses, Minus)

**SHEET Window**

MENU Settings Recalculation Order Optimal
MENU Settings Zero (No, Yes)

**FORM Window**

MENU Field (Insert, Delete, Move)

**COMM Window**

MENU Settings Send Format (No, Yes)

### Add-ins

INPUT.APP*
NETFILE.APP
OUTLINER.APP*
SPELLER.APP
STAT.APP*
VT100.APP

*You can use the *Symphony* Release 2.0 version of the add-in, but it was not provided with Release 1.1.

### Translate Options

*1-2-3* Release 2.01
*dBase III*
DCA RFT format
*Multiplan* SYLK file
*Symphony* Releases 1.2 and 2.0

### Macro Keywords

{~} {{} {}}

### DOC Macro Keywords

{AUTO}
{CASE}
{COPY}
{DLEFT}
{DLINE}
{DRIGHT}
{DWORD}
{FORMAT}
{MOVE}
{NEXTPAGE}
{PAGE}
{PASTE}
{REPLACE}
{SEARCH}
{TOPPAGE}

## *Symphony* 1.2 DOES NOT HAVE THESE:

### Menu Choices

**SERVICES Menu**

SERVICES Configuration Document Hard-Tabs (No, Yes)
SERVICES Configuration Other International Negative (Parenthesis, Minus)

**SHEET Window**

MENU Settings Recalculation Order Optimal
MENU Settings Zero (No, Yes)

**FORM Window**

MENU Field (Insert, Delete, Move)

**COMM Window**

MENU Settings Send Format (No, Yes)

### Add-ins

NETFILE.APP
OUTLINER.APP*
SPELLER.APP
VT100.APP

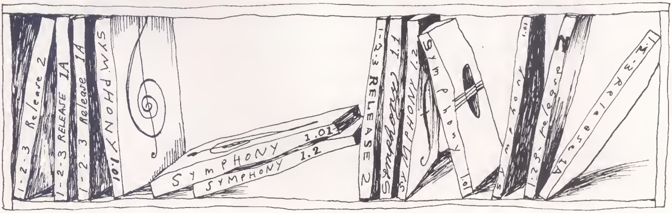
*You can use the *Symphony* Release 2.0 version of the add-in, but it was not provided with Release 1.2.

### Translate Options

DCA RFT format
*Multiplan* SYLK file
*Symphony* Release 2.0

### DOC Macro Keywords

{AUTO}
{CASE}
{COPY}
{DLEFT}
{DLINE}
{DRIGHT}
{DWORD}
{FORMAT}
{MOVE}
{NEXTPAGE}
{PAGE}
{PASTE}
{REPLACE}
{SEARCH}
{TOPPAGE}



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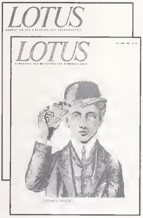

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Troubleshooting your *1-2-3* database ● When revenue equals cost: break-even analysis ● Decision-making with probabilities ● Special Report: Readers tell us about themselves

## 1989, VOLUME 5

**Number 2, February**
Troubleshooting the worksheet: 8 ways to avoid errors ● *1-2-3*'s file-management commands ● Designing effective applications ● Treasury-bond yield analysis

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Help from *Lotus HAL* ● Painless real estate closing statements ● How does your deposit grow: analyzing lump-sum investments ● Special Report: Printing—setup strings, drivers, fonts, utilities, choosing a printer, and more

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# ANSWERS TO YOUR QUESTIONS ABOUT LOTUS PRODUCTS

**1-2-3/SYMPHONY**

## PRINT MULTIPLE COPIES

Q. In the March issue you supplied a setup string that causes the HP LaserJet printer to print several copies of a single worksheet. Is there such a string for Epson printers?

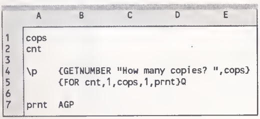
*Sue Spitzberg*
*Nightingale Conant*
*Chicago, Ill.*

A. We couldn't find a setup string in the Epson printer manuals to do the job.

When you select Go from the Print menu, *1-2-3* or *Symphony* prints a copy of the assigned Print range. If you are printing just a few copies, why not simply select Go several times from the Print menu? On most computers you can select Go 15 times in succession without waiting for the printer to catch up. This is much easier than remembering and entering a setup string for multiple copies.

If you wish to print more than 15 copies in a row, you should probably use a photocopier instead of your Epson printer. You can, however, create a simple macro that prompts you to indicate how many copies you want to print. The illustration below shows a macro that works in *1-2-3* Release 2 and higher and in *Symphony*.

To create the macro, enter labels as shown, then assign the labels in column A as range names for the adjacent cells of column B. To assign the range names, press the slash key (in *Symphony* press MENU), select Range Name Labels Right, and indicate range A1..A7. Then save the macro in its own file.



```
     A      B          C          D          E

1    cops
2    cnt
3
4    \p     {GETNUMBER "How many copies? ",cops}
5           {FOR cnt,1,cops,1,prnt}Q
6
7    prnt   AGP
```

To use the macro, retrieve the worksheet you want to print, and use the File Combine command to place the macro in that file. The File Combine command doesn't combine range names in *1-2-3*, so you should reassign the range names as described above. Assign all the print settings you wish to use, then return to the main Print menu.

In *1-2-3* you can do this while in Ready mode by selecting /Print Printer. In *Symphony* the main Print menu appears when you select SERVICES Print. In either case, start the macro by holding down the MACRO key (Alt on most computers) and pressing P.

The macro asks how many copies you wish to print. Respond by typing a number and pressing Return. Then sit back and wait.

## MAKING PHI CHARACTER

Q. I need to include the special symbol Ø (phi) in my spreadsheet printouts. I make the symbol on a typewriter by typing a zero (0), pressing the backspace key, and overstriking with a slash (/). How can I get *1-2-3* to print this symbol?

*Greg Cloud*
*Greg Cloud Consulting*
*and Petroleum Engineering*
*Austin, Tex.*

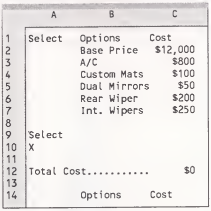
A. You can produce the desired character by pressing the COMPOSE key followed by a capital letter O and a slash (/). The character that appears on your screen will look like a typical zero. When you print this character, however, it will appear as a zero with a slash through it. The appearance of the phi will vary, depending on the type and quality of the printer you're using and your setup string.

## PROVIDING A SELECTIVE LISTING AND TOTAL

Q. I have a *1-2-3* spreadsheet that contains a list of items, their base prices, options that people can purchase along with the items, and the cost of each option. When someone makes a purchase, I need to produce a list of the selected options and the total cost of the items and options bought. How can I do this?

*Charles L. Brooks*
*Phoenix, Ariz.*

A. You can arrange your data as a database. Each row in the database is a record, and each column is a field. The fields contain the same type of information for all records. The following worksheet contains the base price and several options for a car. You can use the Data Query Extract command to provide the list of options selected by a customer.



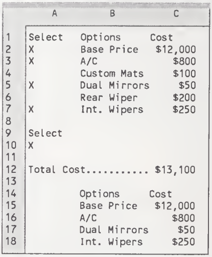
```
       A          B               C

1    Select     Options         Cost
2               Base Price    $12,000
3               A/C              $800
4               Custom Mats      $100
5               Dual Mirrors      $50
6               Rear Wiper       $200
7               Int. Wipers      $250
8
9    Select
10   X
11
12   Total Cost...........         $0
13
14              Options         Cost
```

To see how this works, build the model as follows: Set the width of column B to 12, and enter the labels and values shown in range A1..C7 and in cell A12. Copy cell A1 to cell A9 and enter an X in cell A10. To format the values in column C, select /Range Format Currency (in *Symphony*, MENU Format Currency), enter 0, and specify range C2..C12. Copy the field names *Options* and *Cost* from range B1..C1 to cell B14. Now enter the formula @DSUM(A1..C7,2,A9..A10) in cell C12. You're ready to create the list of your customer's selected options.

Place a capital X in row 2 of column A to select the base price of the automobile, then put an X in each row of the options the customer chooses. As you mark each option, the value in cell C12 adjusts to show a new total.

When you finish marking options, select /Data Query Input (in *Symphony*, MENU Query Settings Basic Database) and indicate range A1..C7. Select Criterion and indicate range A9..A10, then select Output and indicate range B14..C14. Now select Extract (in *Symphony*, Quit Quit Extract), and the selected options appear beneath the labels in range B14..C14, as in the figure below:



| | A | B | C |
|---|---|---|---|
| 1 | Select | Options | Cost |
| 2 | X | Base Price | $12,000 |
| 3 | X | A/C | $800 |
| 4 | | Custom Mats | $100 |
| 5 | X | Dual Mirrors | $50 |
| 6 | | Rear Wiper | $200 |
| 7 | X | Int. Wipers | $250 |
| 8 | | | |
| 9 | Select | | |
| 10 | X | | |
| 11 | | | |
| 12 | Total Cost........... | | $13,100 |
| 13 | | | |
| 14 | | Options | Cost |
| 15 | | Base Price | $12,000 |
| 16 | | A/C | $800 |
| 17 | | Dual Mirrors | $50 |
| 18 | | Int. Wipers | $250 |

## FILE PARTS MISSING

Q. About once every six months, I receive the error message *Part of file is missing*. What causes this error, and how can I recover the file?

*David E Dorn*
*United Refining Co of Pennsylvania*
*Warren, Pa*

A. There are plenty of possible causes for this problem and probably as many methods of recovery. The message means that somehow the file you're trying to retrieve has been damaged. The damage may be limited to a single bit "dropping out," but it's enough to convince DOS and *1-2-3* or *Symphony* that the file isn't usable.

There's some chance that disk wear and tear has degraded your system's performance. Whether you use a hard disk or a floppy disk, when you record and erase files successively, the information in a single file might become distributed over several areas of the disk. The more fragmented your files become, the greater the likelihood that your system will have trouble piecing them together during file-retrieval operations.

It's also possible that your electrical system experiences occasional power surges. Such a power surge during disk-access procedures can result in a glitch on the disk and make a file unusable. If the files that give you trouble are on floppy disks, maybe they've gotten too close to a source of magnetism. Even the magnets in a telephone can damage data on a floppy disk.

Floppy-disk drives can go out of alignment through continued use. It's possible that a floppy-disk drive can be so slightly out of alignment that it almost never causes problems. However, one time in several hundred, the drive might not record information in exactly the right spot. If you use your computer every day and face this problem only once in six months, you may be beating the odds. It would be interesting to hear from our readers how often they experience this problem.

At any rate, when you receive this error message, press Escape. Much of the original file is often still intact and appears when you clear the error message.

If you've lost irreplaceable data, don't save anything new on the disk containing the problem file. Use a program such as *The Norton Utilities* or *Spreadsheet Toolbox*, and follow the instructions to repair a damaged file.

In any case, always be sure to make backups of the files you can't afford to be without. Should anything go wrong with one copy of a disk file, you're likely to be able to retrieve a copy stored on a different disk.

## RIGHT-ALIGNED MONTHS

Q. I need the name of the month to appear as a right-aligned label in about 50 cells scattered throughout a large worksheet. I've created a large macro that prompts me to enter the month, then copies the entry to each of the 50 cells. This seems like a clunky way to solve a simple problem.

Is there a formula that I could enter in each of the 50 cells and thereby display the month's name as a right-aligned label?

*Jonathn Couse*
*Growth Enterprises*
*Seattle, Wash*

A. You can write one formula that produces the label alignment you desire. You'll have to copy it to all 50 cells, but once you've done that, you can enter a single label in cell A1 and see it replicated as a right-aligned label throughout your worksheet. Enter the following formula in cell A3:

```
@REPEAT(" ",@IF((@CELL
   ("width",A2..A2)-@LENGTH
   ($A$1)<1),0,@CELL("width",
   A2..A2)-@LENGTH($A$1)-1))
   &$A$1
```

Note that this formula is updated only when it is recalculated. If you change the width of a column that contains the formula, the month label won't be right-aligned until you recalculate the worksheet. Also, changing the entry in cell A1 won't cause the other formulas to be updated unless the worksheet is set for automatic recalculation.

## COPYING ABSOLUTE REFERENCES IN WORKSHEET

Q. I was surprised by the advice in your April article "When Two (or More) Become One." You suggested that we use the File Xtract and File Combine commands when we wish to copy formulas that have absolute references but want the absolute references to adjust relative to their new positions in the worksheet. This is a useful technique, but why go to the trouble of extracting the formulas to disk before combining them into the sheet at the new location?

It is much easier to use the File Combine Copy Named/Specified-Range command. Indicate the range of cells you wish to copy, and specify the current file as the one to combine. This saves an entire step in the copying procedure.

*Steven Lear*
*Fidelity Management & Research Co*
*Boston, Mass*

A. Your approach is fine when you're working in *1-2-3* and you've already saved the current worksheet with the for-

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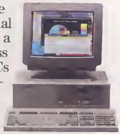

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mulas you wish to copy. If you haven't yet saved the worksheet, it doesn't have a file name that you can use in the File Combine command.

Also, remember not to combine an older version of your file onto a newer version. If you saved the worksheet and then made changes to the formulas, combining an old version of the file will destroy the newer formulas.

*Symphony* users can use your approach only if they've both named the range that contains the formulas they wish to copy and saved the worksheet. *Symphony* doesn't let you enter cell addresses to identify a range to combine from another file.

## GOTO AND NAME KEYS

Q. We use the GOTO key in synchrony with the NAME key to find our way quickly around the worksheet. If you press GOTO, then press NAME twice, you produce a full-screen listing of the range names that are in the current worksheet. If you move the cell pointer to a desired range name and press Return, the cell pointer jumps directly to the selected range. Is this an overlooked feature?

*Alfred A. Janten*
*Grosse Ile, Mich*

A. Some people probably aren't aware of the feature, but it does surface occasionally in this and other sections of the magazine. You won't find it listed in the *1-2-3* Release 2.01 manual's index. The technique works as you've described it in all releases of *1-2-3* except Release 1A. In Release 1A, you can't produce the full-screen listing, although if you press the NAME key once you produce a one-line listing of available range names in the control panel.

*Symphony* users can press GOTO, then MENU MENU to obtain a screen-size listing of range names.

## FILE STRUCTURE

Q. Is a technical description of the Lotus file structure available from your magazine? I need to know the file structures so that I can write software that manipulates data from *Symphony* and *Lotus Freelance Plus.*

*Ng Kek Wee*
*Toa Payoh*
*Republic of Singapore*

A. Addison-Wesley Publishing Co. publishes a book called *Lotus File Formats.* You may find a copy in the computer-books section of a local book store, but you'll probably have more luck if you contact Addison-Wesley directly. Their address and phone number are Addison-Wesley Publishing Co., Reading, Mass. 01867; 617-944-3700.

## THE COMPOSE KEY

Q. What is the COMPOSE key? You mentioned it in the March Q&A entry entitled "Underlining Characters in the Same Cell."

*Rob Thieme*
*Leisure Arts*
*Little Rock, Ark*

A. The COMPOSE key lets you enter characters that aren't on your keyboard. On most computers, you can activate the COMPOSE function by holding down the Alt key and pressing F1. No apparent change appears on the screen, but the next two keys you press can produce an unusual character.

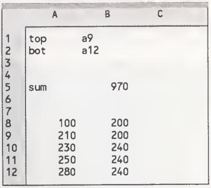
For example, when you press the COMPOSE key followed by a caret and a zero (^0), *1-2-3* and *Symphony* produce a degree symbol (°) on the display. Check your documentation or the Help facility for a complete list of the characters you can compose, but be aware that not all printers can print them.

## CHANGE SUM RANGES

Q. My worksheet contains several columns of data from which I select ranges to sum. I often need to rewrite @SUM formulas when I wish to sum different ranges. I've tried to use the @@ function to let me enter a range address in the worksheet and to have the @SUM formula automatically adjust to sum the new range. Unfortunately, I've had no success. How can I accomplish this?

*Richard Rand*
*Amherst, NY*

A. Look at the worksheet at the top of the next column. Cell B1 contains the label *a9*, and cell B2 contains the label *a12*. You wish the @SUM formula in cell B5 to sum the values in range A9..A12. But you also want the formula to be able to sum values in range A10..B11 when you enter *a10* into cell B1, and *b11* into cell B2.



| | A | B | C |
|---|---|---|---|
| 1 | top | a9 | |
| 2 | bot | a12 | |
| 3 | | | |
| 4 | | | |
| 5 | sum | 970 | |
| 6 | | | |
| 7 | | | |
| 8 | 100 | 200 | |
| 9 | 210 | 200 | |
| 10 | 230 | 240 | |
| 11 | 250 | 240 | |
| 12 | 280 | 240 | |

The formula you need in cell B5 is @SUM(@@(+B1&".."&B2)). It sums the values in the range identified by the expression @@(+B1&".."&B2). The expression +B1&".."&B2 produces the label *a9..a12*, so the @SUM formula sums the values in the range identified by *a9..a12*. This is the indirect reference you were trying to create.

## HARDWARE

## WHAT'S EXPANDED MEMORY?

Q. I have a problem running *Symphony* on my NCR PC with 640K of RAM. I'd like to be able to use the add-ins, especially the spelling checker. When I try to attach an add-in, however, I get the error message *Memory full.*

When I checked the settings sheet by selecting SERVICES Settings, I found 113,577 bytes of conventional memory available out of a total of 114,076 bytes. I have no expanded memory. Could you explain what expanded memory is and how to obtain it?

*Deborah S. Lutchko*
*Township of West Milford*
*West Milford, NJ.*

A. First of all, you must have something more than just *Symphony* in your computer's RAM. On a 640K system, you should have about 265K of RAM available in which to create spreadsheets. You're about 150K short, which means that you must have a background program installed or that something isn't right with some of your RAM. Consider not running the background programs when you wish to use add-ins.

If you really like the background programs and you want to explore expanded memory, you must consider a few things. Your computer has 1,024K of conventional memory. You can access, however, only 640K of that amount. DOS uses this 640K of memory for itself, your applications, and data. The remaining 384K of memory is reserved for your computer's input-output operations.

Expanded memory generally comes in the form of a circuit board that you plug into a slot inside your computer. The Lotus/Intel/Microsoft Expanded Memory Specification (LIM-EMS) provides a means by which software can access memory beyond the 640K barrier. If a software program is written to take advantage of the LIM-EMS specification, you may gain an advantage by installing added memory.

Although *Symphony* Releases 1.1, 1.2, and 2.0 use the LIM-EMS specification to access expanded memory, very little of *Symphony*'s program code actually stores itself above the 640K barrier. Depending on the release of *Symphony* that you use, some of your data end up beyond the 640K barrier.

For each cell entry that goes into expanded memory, *Symphony* Release 2.0 creates in conventional memory a 4-byte pointer that the operating system uses to keep track of the data in expanded memory. This means it takes much longer to run out of conventional memory when you have expanded memory installed.

On the other hand, because *Symphony* Release 2.0's textual information, such as menus and help screens, occupies expanded memory directly, installing more RAM isn't likely to let you squeeze in those add-ins.

If you're lucky, one or more of your background programs might automatically place itself in expanded memory. This would free up some of the conventional memory that *Symphony* needs to run add-ins. Before you invest in an expanded-memory card, check the documentation of your background programs to determine whether they can use expanded memory.

We understand that the next release of *Symphony* will fully utilize expanded memory.

## SHOW YOUR COLORS

Q. When I used *1-2-3* on an IBM PC, I could set the computer to display red and black characters on a blue background. With my new NEC Powermate Personal Computer, I'm stuck with the black background and white letters.

My word-processing and accounting software are displayed with the blue background that I prefer. What commands cause *1-2-3* to be displayed with a blue background?

*Holman H. Hurst Jr*
*Intratec Group Ltd*
*New York, NY*

A. *1-2-3* and *Symphony* have no commands or tools to let you alter the products' display colors. If you changed the display colors on an IBM PC, chances are that you used a separate utility program.

There are numerous utility programs that give you greater control over your computer's display within that utility. Among the commercially available programs are *Lotus Metro* (Lotus Development Corp.), *SideKick* (Borland International), and *Ultravision* (Personics Corp.). Also available are shareware and public domain products, which you can obtain from user-group libraries and from on-line information services such as CompuServe.

Perhaps our readers will tell us what utilities they use, if any, to modify *1-2-3*'s and *Symphony*'s color schemes. If so, we'll publish a list in a future issue.

**SYMPHONY**

## SET PAGE NUMBER

Q. I use *Symphony*'s word processor to type scripts. Because the scripts are long, I save each act in a separate file. Therefore, when I print the entire script, the pages aren't numbered sequentially.

Obviously the printer numbers the pages of the first act correctly, but I can't find a way to tell the printer to start numbering the subsequent acts where it left off numbering the previous ones. What can I do about this?

*Helen Russell*
*Calgary, Alberta*

A. Note the last page number of Act I. Then retrieve Act II, and set all necessary print settings as you normally would. Make sure you manually align the paper in your printer, and select Align from the Print menu. Then select Settings Page Number Print-Number and enter the number that *Symphony* should put on the first page of Act II.

Select Quit Quit to return to the main Print menu, and select Go without selecting Align. *Symphony* numbers the pages as you've indicated. If you select Align after you enter Act II's starting page number, *Symphony* resets numbering to 1. That's why it's important to align the paper in the printer before you enter the starting page number. Repeat these steps for each successive act of your script.

**CONTEST**

## NEW CONTEST

This month we would like users of *1-2-3* Release 2 and higher and *Symphony* to submit the best formula to generate fiscal years in the format FY XX across a row in a worksheet. For example, if you enter FY 89 in cell A1, your formula in cell B1 will contain a formula that evaluates to FY 90. Make sure that your formula works for the years 2000 and beyond, returning FY 00, FY 01, FY 02, and so on. This idea was submitted by Sarah Casseday of Arlington, Va.

The first 25 people who submit entries that the *LOTUS* judges consider the best answer will receive a *LOTUS* flight bag. Please send your answer on a nonreturnable disk along with a printout of your contest entry, documented with appropriate comments. All entries must be postmarked before midnight, October 31, 1989. Winners will be announced in the January 1990 issue. Send your answers to **October Contest,** *LOTUS* Magazine, P.O. Box 9123, Cambridge, MA 02139-9123.

Submit contest ideas to Q&A Contest Idea, *LOTUS* Magazine, P.O. Box 9123, Cambridge, MA 02139-9123. Include your solution, documented with appropriate comments. We'll pay $200 if we use your contest idea accompanied by a proven solution. We'll pay $25 if we use your idea unaccompanied by a solution.

---

*This material was prepared by Daniel Gasteiger and the Technical Editors.*

**WRITE US**

*Do you have a question? We can't answer every letter, but if yours is selected, we'll publish it along with an answer or a request to other readers for advice. We'll pay $25 for each letter we publish. Send your letters, including your address and daytime phone number, to: Q&A,* LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

# READER TIPS ON USING LOTUS PRODUCTS

**1-2-3/SYMPHONY**

## DRIVER-FILE ERROR

When I tried to add new device drivers by using the *1-2-3* Release 2.01 Install program, I received the error message *Error reading a driver file.* I found out that this message occurs when the Install program cannot properly read the driver file you're trying to add. This may be because the driver files are damaged or because the directory may contain driver files that don't work with *1-2-3*.

To find and correct the problem, follow these steps:

1. Exit the Install program.

2. In DOS, with the *1-2-3* program directory current, enter the following DOS DIR command in order to display all the driver files in that directory:

```
dir *.drv
```

3. If the directory lists only the driver files that you are adding, one or more of these files may be damaged. Try recopying the driver files from the original disk to the directory and rerunning the Install procedure. If you still get the error message, you may have a damaged driver disk. Check the disk by using the DOS CHKDSK command. If this check indicates that there are bad sectors on the disk, you will need to ask the manufacturer to replace the disk.

4. If the directory contains additional driver files that you don't intend to use with *1-2-3*, follow one of two procedures. You can move the non–1-2-3 drivers from the *1-2-3* directory to another directory and rerun the Install program to add the new device drivers. Or you can use the DOS RENAME command to temporarily rename the driver files that you don't need so that they no longer have the .DRV file extension. Rerun the Install program to add the new drivers. Then rename the driver files, giving them their original names.

*Jade Dornfeld*
*Topanga, Calif.*

*This problem also occurs in* Symphony *Releases 1.1, 1.2, and 2.*

## FISCAL-MONTH NUMBER IN CALCULATIONS

Our business's fiscal months do not coincide with calendar months. Therefore, I've developed the following technique to perform analyses per fiscal month, which uses *1-2-3*'s date arithmetic to set the criterion for the database statistical @functions.

First, set up a date-input table as shown in the following figure:

|  | A | B |
|---|---|---|
| 1 | Date | Fiscal Month |
| 2 | 01-Sep-88 | 1 |
| 3 | 26-Sep-88 | 2 |
| 4 | 24-Oct-88 | 3 |
| 5 | 28-Nov-88 | 4 |
| 6 | 26-Dec-88 | 5 |
| 7 | 23-Jan-89 | 6 |
| 8 | 27-Feb-89 | 7 |
| 9 | 27-Mar-89 | 8 |
| 10 | 24-Apr-89 | 9 |
| 11 | 29-May-89 | 10 |
| 12 | 26-Jun-89 | 11 |
| 13 | 24-Jul-89 | 12 |
| 14 | 01-Sep-89 | Next Year |

Save this table as a separate file that you can combine into any spreadsheet requiring fiscal-month calculations. The dates in column A are the start days for each fiscal month for a fiscal year that begins in September. Enter the dates by using the @DATE function, and format range A2..A14 for Date 1. In range B2..B13 enter the month number by using the Data Fill [in *Symphony*, Range Fill] command. The date in cell A14 is the beginning of a new fiscal year, as the label in cell B14 indicates. I used the default width of column B, but you should widen the column so that the label *Fiscal Month* won't be truncated. Each record in my database has an entry date, which you can see in column C in the following figure:

|  | C | D | E | F |
|---|---|---|---|---|
| 1 | Date | Item | Cost | Month |
| 2 | 15-Sep-88 | 0001 | 1000 | 1 |

In cell F2 enter the @VLOOKUP formula that follows. It will evaluate to the fiscal-month number that corresponds to the entry date in cell C2:

```
@VLOOKUP(C2,$A$2..$B$14,1)
```

Now you can use the database statistical @functions to produce statistics for any fiscal month by setting up a Criterion range that includes the *Month* field and by specifying the desired fiscal-month number as the criterion.

*Jeanne Baer*
*Greenville, N.C.*

## COPY SAME SOURCE SEVERAL TIMES

I wish *1-2-3* had a copy feature like the one in my favorite word processor, which allows me to make multiple copies of the same phrase in a document without respecifying the source.

I've written a one-line macro that lets you do just that. To create the macro, in cell A1 enter *\c* and in cell B1 enter *'/cthis~~*. To name the macro, place the cell pointer on cell A1, select /Range Name Labels Right, and press Return. Before you use the macro, you need to use the Range Name Create command to assign the range name *this* to the range you want to copy.

To use the macro to make your first copy, place the cell pointer on the first cell you want to copy to, then hold down the MACRO key (Alt on most computers) and press C. To make more copies in the spreadsheet, move the cell pointer to each new destination and run the macro again.

If you have your destination ranges arranged in a consecutive vertical or horizontal order, add cursor-movement commands to the macro so that it positions the cell pointer at the starting point for the next copy operation. For example, if the To ranges are spaced every three rows in a column, modify the macro in cell B1 to read *'/cthis~~{D 3}*.

*Terrence W. Reigel*
*Warren, N.J.*

*In* Symphony *substitute {DOWN 3} for {D 3}. In* 1-2-3 *Release 1A substitute {DOWN}{DOWN}{DOWN}.*

## CONVERTING JULIAN DATES

I've developed the following formula to convert Julian dates to the Lotus date serial numbers. A Julian date is a four-digit number with the first digit representing the year and the last three digits representing the day of the year. The U.S. Air Force uses Julian dates on forms that collect data regarding maintenance. I then enter them into a *1-2-3* database. I need to calculate elapsed-day information and to display these dates as calendar dates for reports I generate. To see how my formula works, enter the Julian date 7365 into cell A4. In cell A5 enter the following formula:

```
@DATE(@CHOOSE(@INT(A4/1000),
  90,91,92,93,94,95,96,97,
  88,89)−1,12,31)+(A4−
  @INT(A4/1000)*1000)
```

Assign the Date 1 format to cell A5. The formula will evaluate to 31-DEC-97. This formula will handle Julian dates from January 1, 1988, through December 31, 1997. You can easily vary the argument that you use with the @CHOOSE function if you need to include a different range of start and stop years as variables.

*Kent Reilley*
*Boeing Military Airplanes*
*Wichita, Kans.*

### REVISITED

## CREATING FANCY BORDERS

Thomas Wood shared his technique for creating fancy borders in a *1-2-3* worksheet [July 1988]. I too would like to share a method that allows you to create borders in a worksheet.

To see how my method works, hold down the Alt key, enter a three-digit number, for example, 128, then release the Alt key and press Return. This key combination causes the letter C with a cedilla (Ç) to be displayed on the screen. You must use the numeric keypad to enter the three-digit ASCII code. If you use the numbers on the top row of the main keypad, *1-2-3* will not display the corresponding character. To create a border, press the backslash key (\) followed by the three-key code.

*Greg S. Jackson*
*Fairfield Communities Inc*
*Little Rock, Ark.*

*Your technique uses ASCII codes rather than the LICS codes used by Thomas Wood. Be aware that* 1-2-3 *and* Symphony *spreadsheets won't recognize*

What Can a Spreadsheet Compiler Do for You?

If your answer is that a spreadsheet compiler can create templates that run without Lotus 1-2-3, hide macros and formulas from end users, and configure colors and borders, you are only half right.

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- support both expanded and virtual memory to allow large worksheets to run
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- customize the appearance of applications with context-sensitive help and vertical menus
- allow you to program part of your application in the C language
- support sideways printing

You can buy a spreadsheet compiler without any of these features, or buy one that has them all. Let the table help you decide.

| | Templates run w/o 1-2-3 | Secures macros and formulas | Compiles macros | Minimal recalc | Expanded memory | Symbolic debugger | Context-sensitive help | Virtual memory | Sideways printing | User defined functions | Macro loop 3000 times* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **King Jaguar** | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | 21 |
| **Jaguar** | ● | ● | ● | ● | ● | ● | ● | | | | 21 |
| @ Liberty™ (2.01) | ● | ● | | | | | | | | | 2:09 |
| 1-2-C (1.5) | ● | ● | | | | | | | | | 3:49 |
| Baler™ (4.0) | ● | ● | | | | | | | | | 7:01 |
| Lotus 1-2-3® (2.01) | | | | ● | ● | | | | | | 4.17 |

*Tested on an 8086 system

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*many ASCII codes. Using your technique, Release 3 comes close to full ASCII compatibility but still substitutes about four dozen fallback characters for ASCII codes.*

*This technique also works in* Symphony*'s SHEET window.*

## PROFESSIONAL UNDERSCORE WITH THE HP LASERJET

Here are some more HP LaserJet setup strings to increase your underlining prowess. [See J. Fred Boone's letter, February.] Enter any of the following strings with the Print Printer Options Setup (in *Symphony*, SERVICES Print Settings Init-String) command to get the respective print styles with underlining.

| **Portrait mode** | **Characteristics** |
|---|---|
| \027E\027&k0S\027&dD | Normal print, underlined |
| \027E\027&k0S\027(s3B\027&dD | Normal, emphasized, underlined |
| \027E\027&k2S\027&l6D\027&dD | Compressed, underlined, standard spacing |
| \027E\027&k2S\027&l3D\027&dD | Compressed, underlined, double spacing |
| **Landscape mode** | |
| \027E\027&l1O\027&k2S\027&dD | Compressed, underlined |
| \027E\027&l1O\027&k0S\027&dD | Normal print, underlined |

I used the following setup string to produce the report with compressed, underlined, standard spacing in figure 1.

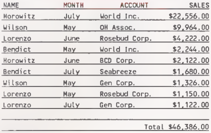
\027E\027&k2S\027&l6D\027&dD

I used the next setup string to create the report with compressed, underlined, double spacing in figure 2.

\027E\027&k2S\027&l3D\027&dD

Using any of these underlining setup strings has one limitation. The underline will extend only as far as the data in each row. If one row is shorter than the others, the underline will not match those other rows. One solution is to place a period or an underscore in the last cell of a short row.

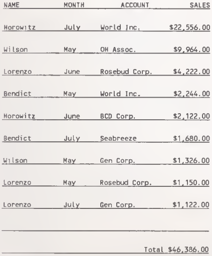
*Jana Babineau*
*Exxon USA*
*Houston, Tex*



```
NAME        MONTH      ACCOUNT              SALES
Horowitz    July       World Inc.      $22,556.00
Wilson      May        OH Assoc.        $9,964.00
Lorenzo     June       Rosebud Corp.    $4,222.00
Bendict     May        World Inc.       $2,244.00
Horowitz    June       BCD Corp.        $2,122.00
Bendict     July       Seabreeze        $1,680.00
Wilson      May        Gen Corp.        $1,326.00
Lorenzo     May        Rosebud Corp.    $1,150.00
Lorenzo     July       Gen Corp.        $1,122.00

                                 Total $46,386.00
```

**FIGURE 1**



```
NAME        MONTH      ACCOUNT              SALES

Horowitz    July       World Inc.      $22,556.00

Wilson      May        OH Assoc.        $9,964.00

Lorenzo     June       Rosebud Corp.    $4,222.00

Bendict     May        World Inc.       $2,244.00

Horowitz    June       BCD Corp.        $2,122.00

Bendict     July       Seabreeze        $1,680.00

Wilson      May        Gen Corp.        $1,326.00

Lorenzo     May        Rosebud Corp.    $1,150.00

Lorenzo     July       Gen Corp.        $1,122.00


                                 Total $46,386.00
```

**FIGURE 2**

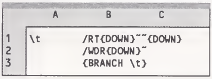
## ANOTHER WAY TO CREATE dBASE III FILES IN 1-2-3

Frank W. Sheffler suggested creating *dBase III* files in *1-2-3* [June 1988]. I'd like to share some ideas for using *1-2-3*'s Translate utility to convert word-processing files that have lists of data arranged in a columnar format into the *dBase III* format.

You must first reformat the word-processing document by deleting tabs, headings, and subheadings. If the document has more than 8,192 rows, you need to divide the file into two or more word-processing files.

Next, convert the word-processing file (or files) into ASCII file format if it isn't already in that format.

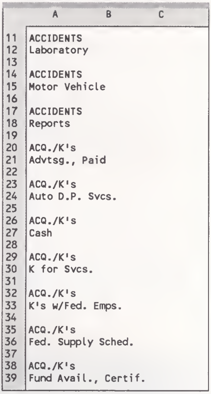
Load *1-2-3* and enter the following labels in range A1..B3. Move the cell pointer to cell A1, and select /Range Name Labels Right to assign the range name \t to cell B1.



```
        A          B               C

1   \t         /RT{DOWN}~~{DOWN}
2              /WDR{DOWN}~
3              {BRANCH \t}
```

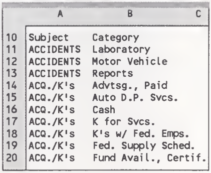
Move the cell pointer to row 11, select /File Import Text, and specify the first ASCII file name you want to import. *1-2-3* imports all data from the text file to a single column, as in the following:



```
         A          B          C

11  ACCIDENTS
12  Laboratory
13
14  ACCIDENTS
15  Motor Vehicle
16
17  ACCIDENTS
18  Reports
19
20  ACQ./K's
21  Advtsg., Paid
22
23  ACQ./K's
24  Auto D.P. Svcs.
25
26  ACQ./K's
27  Cash
28
29  ACQ./K's
30  K for Svcs.
31
32  ACQ./K's
33  K's w/Fed. Emps.
34
35  ACQ./K's
36  Fed. Supply Sched.
37
38  ACQ./K's
39  Fund Avail., Certif.
```

You need to organize the data into *1-2-3*'s database format, in which each record is stored in one row and all fields are stored in consecutive columns. To do this, you must transpose the rows of data in column A into multiple columns that correspond to the fields in a database.



```
         A           B                    C

10  Subject     Category
11  ACCIDENTS   Laboratory
12  ACCIDENTS   Motor Vehicle
13  ACCIDENTS   Reports
14  ACQ./K's    Advtsg., Paid
15  ACQ./K's    Auto D.P. Svcs.
16  ACQ./K's    Cash
17  ACQ./K's    K for Svcs.
18  ACQ./K's    K's w/ Fed. Emps.
19  ACQ./K's    Fed. Supply Sched.
20  ACQ./K's    Fund Avail., Certif.
```

First, set the width of each column in the *1-2-3* worksheet to correspond to the width of each field of the *dBase III* database, as shown in the preceding figure. Then in row 10, enter the field names, with each field name in a separate column. Use *1-2-3*'s Range Transpose command to move the data from column A, starting with cell A11, or use the macro in the first figure to perform this task. Make sure that you place the macro above all data, since the macro deletes rows.

Although the macro is based on my application, which has 12 fields of data, I'll use only two fields in this example. You must adjust the macro for the number of fields in your database. You can accomplish this by entering an additional {DOWN} command for each added field. Add the {DOWN} command after the T in the first row of the macro, and after the R in the second row of the macro. The macro assumes there is one blank row between each record.

The macro transposes the data from rows 11 and 12 to columns A and B, starting at cell A11. The macro deletes rows 12 and 13, and then it repeats the procedure.

Here's how the macro works:

/RT{DOWN}~~{DOWN} selects /Range Transpose and highlights the current cell and the one below it, presses Return twice to complete the Transpose command, and moves the cell pointer down one cell.

/WDR{DOWN}~ selects /Worksheet Delete Row and deletes two rows.

{BRANCH \t} loops back to start the macro.

To stop the macro, hold down the Control key and press the Break key.

After you transpose all the records for each ASCII file, combine the reformatted *1-2-3* database files into a single *1-2-3* file in order to simplify the translation to *dBase III*'s file format. Then convert the *1-2-3* file to *dBase III*'s file format by using *1-2-3*'s Translate utility.

*Anthony J. Santarsiero*
*Centers for Disease Control*
*Atlanta, Ga*

## USE @REPLACE FUNCTION TO ADD TEXT

In the October 1988 issue, Eric Sanderson described his method of using *1-2-3*'s concatenation capabilities to include text in the same cell as a reference to a formula. I'd like to share a method I use to accomplish the same results. It uses the @REPLACE function. For example, in cell B5 enter .1 to indicate a 10% growth. In cell B7 enter the following formula:

```
@REPLACE("A % growth was
  experienced",2,0,
  @STRING(B5*100,0))
```

This will result in the label *A 10% growth was experienced* in cell B7.

*Michael F. Gardner*
*Clovis, Calif.*

*This formula doesn't work in* 1-2-3 *Release 1A. Note also that if cell B5 is blank, the result in cell B7 will be* A 0% growth was experienced.

---

*This material was prepared by Subhadra Mattai and the Technical Editors.*

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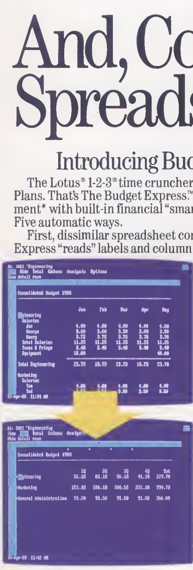

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> *Michael J. Miller*
> *InfoWorld, 5/15/89*

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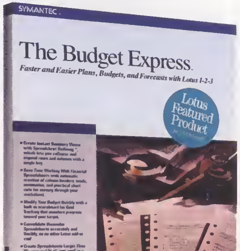
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CIRCLE 114 ON READER SERVICE CARD

# GRAPHS, TABLES, AND TEXT

## Spruce up your *Lotus Manuscript* documents with *1-2-3* data.

BY WILLIAM G. SAUNDERS

Do you use Scotch tape and the Xerox machine every time you need to insert a chart or a table into a report? If you use *Lotus Manuscript* or *WordPerfect* for word processing, there's a better way to work.

In this tutorial you'll see how to use *Manuscript* to integrate text, spreadsheet tables, and graphics into a single report. In a later issue, we'll cover similar capabilities in *WordPerfect*. You can also use a desktop publishing program to illustrate documents, but if you don't need all the services of such software, a word processor is a far simpler and more efficient solution.

*Manuscript* can import and format data and images from a variety of sources. You can convert an entire worksheet into a *Manuscript* document or directly import ranges from worksheets into an existing document. An imported range appears in *Manuscript* as a specially structured table, which makes it easier to format and manipulate the data for your report.

*Manuscript* also imports graphics files, including *1-2-3* and *Symphony* PIC files, metafiles (GMF or CGM files) from such programs as *Lotus Freelance Plus* and *Harvard Graphics*, regular or encapsulated PostScript files (PS or EPS files), and most file types produced with Datacopy, Microtek, HP ScanJet or DEST scanners.

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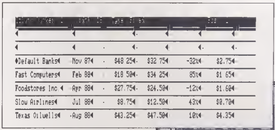
*William G. Saunders, a consultant based in North Reading, Mass., is a frequent contributor to* LOTUS.



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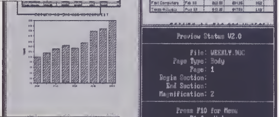
| ♦Default Banks◄ | Nov 87◄ | $48 25◄ | $32 75◄ | -32%◄ | $2.75◄ |
| Fast Computers◄ | Feb 88◄ | $18 50◄ | $34 25◄ | 85%◄ | $1 65◄ |
| Foodstores Inc ◄ | Apr 88◄ | $27.75◄ | $24.50◄ | -12%◄ | $1.60◄ |
| Slow Airlines◄ | Jul 88◄ | $8.75◄ | $12.50◄ | 43%◄ | $0.70◄ |
| Texas Oilwells◄ | Aug 88◄ | $43.25◄ | $47.50◄ | 10%◄ | $4.35◄ |

**FIGURE 1. In *Manuscript*, the imported table appears on the editing screen. The Column and Table Editor occupies the top two lines of the screen.**

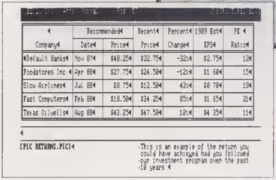


Preview Status V2.0

File: WEEKLY.DOC
Page Type: Body
Page: 1
Begin Section:
End Section:
Magnification: 2

Press F10 for Menu
F1 for Help

**FIGURE 2. The Print Preview screen depicts the document as it will look when it's printed. The portion of the page within the movable rectangle (top left) appears enlarged in the top-right window.**



| ◄ | Recommended◄ | | Recent◄ | Percent◄ | 1989 Est◄ | PE ◄ |
|---|---|---|---|---|---|---|
| Company◄ | Date◄ | Price◄ | Price◄ | Change◄ | EPS◄ | Ratio◄ |
| ♦Default Banks◄ | Nov 87◄ | $48.25◄ | $32.75◄ | -32%◄ | $2.75◄ | 12◄ |
| Foodstores Inc ◄ | Apr 88◄ | $27.75◄ | $24.50◄ | -12%◄ | $1.60◄ | 15◄ |
| Slow Airlines◄ | Jul 88◄ | $8 75◄ | $12.50◄ | 43%◄ | $0 70◄ | 18◄ |
| Fast Computers◄ | Feb 88◄ | $18.50◄ | $34 25◄ | 85%◄ | $1 65◄ | 21◄ |
| Texas Oilwells◄ | Aug 88◄ | $43.25◄ | $47.50◄ | 10%◄ | $4 35◄ | 11◄ |

[PIC RETURNS.PIC]◄

This is an example of the return you could have achieved had you followed our investment program over the past 10 years ◄

**FIGURE 3. The final document as it appears on the editing screen**

### BUILDING AN APPLICATION

Let's assume that as head of research for a brokerage house you want to publish your regular summary sheet of stock recommendations. You write your analysis, download the most recent stock quotations into a *1-2-3* template, and recalculate the new financial ratios. Finally, you want to print your report, complete with updated tables and graphs that are automatically imported into your document.

First, load *1-2-3* or *Symphony* and create the worksheet from which you'll import a table and a graph. Refer to the "Stock-Price Analysis" box on page 89 for instructions. Save the file under the name STOCKS. Then exit *1-2-3* or *Symphony*.

Now load *Manuscript*. In a moment, a full-screen menu called the Document Manager will appear. If this is the first time this copy of the program has been used, refer to the section of the manual concerning setting up the program.

If the Edit Document option isn't highlighted when you're ready to start work, press E to highlight that choice and press the Insert key to select it. Note that *Manuscript* uses the Insert key to confirm many commands. Enter the name *Weekly* next to the *Document name* prompt and press the Insert key. Move the cursor down to the *Description* prompt and enter *Weekly stock recommendations report*. You can ignore the

*Description* and *Author* prompts if you like, but filling them in can make it easier to identify this file later.

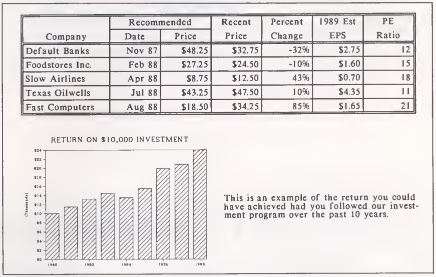
Now press Insert in order to enter the text-editing screen. If you want further information about any of *Manuscript*'s features as you go through this tutorial, press the F1 key to display one of the program's context-sensitive help screens. The directory at the bottom of each help screen helps you move to other information that may interest you. To leave the help screen, press the Escape key.

## BLOCKING THINGS OUT

*Manuscript* lets you organize the document's text into a series of blocks. A block can contain a paragraph, a headline, one row of a table, one item in a bulleted list, or a graph imported from another program. This method of structuring a document makes no difference if all you do is write simple documents such as memos. However, it will ease your work when your documents grow longer and more complex, or when they incorporate spreadsheet tables.

Now you will import the table from your worksheet. You'll import just one table, but you could import more than one. You can also use either a single worksheet or many worksheets as the source of those tables. Press the MARKER key by holding down the Alt key and pressing F10 to display the Marker command panel. Take a moment to look over the variety of functions that you can perform by using *Manuscript*'s markers.

THE UPGRADE MANUSCRIPT 2.1 IMPORTS 1-2-3 RELEASE 3 DATA.



| Company | Recommended Date | Recommended Price | Recent Price | Percent Change | 1989 Est EPS | PE Ratio |
|---|---|---|---|---|---|---|
| Default Banks | Nov 87 | $48.25 | $32.75 | -32% | $2.75 | 12 |
| Foodstores Inc. | Feb 88 | $27.25 | $24.50 | -10% | $1.60 | 15 |
| Slow Airlines | Apr 88 | $8.75 | $12.50 | 43% | $0.70 | 18 |
| Texas Oilwells | Jul 88 | $43.25 | $47.50 | 10% | $4.35 | 11 |
| Fast Computers | Aug 88 | $18.50 | $34.25 | 85% | $1.65 | 21 |

RETURN ON $10,000 INVESTMENT
(Thousands)
$24
$22
$20
$18
$16
$14
$12
$10
$8
$6
$4
$2
$0
1980
1982
1984
1986
1988

This is an example of the return you could have achieved had you followed our investment program over the past 10 years.

FIGURE 4. The report printed on an HP LaserJet Series II in Times Roman

Then press W twice to move to the Worksheet menu item, press Insert, and the Worksheet panel will appear.

To retrieve the table, you can type the path, file name, and extension (for example, *c:\123\stocks.wk1*) at the *Worksheet file name* prompt. Or you can press the gray plus-sign key, usually located to the right of your computer's numeric keypad, navigate to the correct directory, and see a list of available file names. If you choose the latter method, use the Arrow keys to highlight the file named STOCKS and press the Return key to select it. In either case, press Return again to move to the *Range name* prompt. Press the gray plus-sign key to see a list of the range names contained in the STOCKS file and the addresses of each range. You can specify a range by its name or by its coordinates. In our worksheet, there is only one named range and it is already highlighted, so press Return.

The *When to import data* prompt controls when *Manuscript* will update the data in your table with new data from the *1-2-3* or *Symphony* worksheet. The Now and On Command options should already be checked. The Now option indicates that *Manuscript* will update the table as soon as you finish filling out this panel. The On Command option forces the program to update the table whenever you select the MENU Tools Worksheet command while working on a document. Leave both options checked.

Move the cursor to the During Preview or Final Print option and press the Spacebar to check this line also. This third option updates the printout at the time of printing. If you've made a change to the worksheet and forgotten to update your document with the MENU Tools Worksheet command, *Manuscript* will nonetheless print the updated information in your report. Now press the Insert key to return to your document, and import the worksheet data. The data appears on the editing screen, formatted in columns. Curiously, the During Preview or Final Print option fails to update the document itself; it affects only the printout. You have to use the Now option or import the data through the menu commands to update the document file.

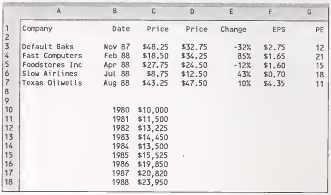
You will now create two new blocks for the table's headings. The small diamond at the top-left corner of the table indicates that the table was imported with a Marker command. With the cursor on the marker diamond, press the SPLIT key (F2) and select Block. Repeat this operation to create two new blocks with the same format as the table.

## FORMAT THE TABLE

You have two layout problems to solve: The table is too wide and the column widths need adjusting. Press the TABLE key (F8) to indicate that you want to edit the table, and press it a second time to extend the highlight over all blocks and columns on the screen. Press Return to display the Column and Table Editor panel on the top two lines of the screen (see figure 1).

The second line of the editing panel lets you specify changes you want to make to the size of a column or to the spacing between columns. You want to make the first column wider and the remaining columns shorter and equal to each other in width. Move the cursor into the second column. You can use the RightArrow key or you can save time on many computers by holding down the Shift key and pressing the RightArrow key. Be aware that on some computers "Shift" hot keys work only with the Arrow keys in the numeric keypad.

Note that the *Width: 10* prompt is displayed on the top line of the screen. Press the Delete key once to decrease the column's width to 9. Now press the



| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Company | Date | Price | Price | Change | EPS | PE |
| 2 | | | | | | | |
| 3 | Default Baks | Nov 87 | $48.25 | $32.75 | -32% | $2.75 | 12 |
| 4 | Fast Computers | Feb 88 | $18.50 | $34.25 | 85% | $1.65 | 21 |
| 5 | Foodstores Inc | Apr 88 | $27.75 | $24.50 | -12% | $1.60 | 15 |
| 6 | Slow Airlines | Jul 88 | $8.75 | $12.50 | 43% | $0.70 | 18 |
| 7 | Texas Oilwells | Aug 88 | $43.25 | $47.50 | 10% | $4.35 | 11 |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | 1980 | $10,000 | | | | |
| 11 | | 1981 | $11,500 | | | | |
| 12 | | 1982 | $13,225 | | | | |
| 13 | | 1983 | $14,450 | | | | |
| 14 | | 1984 | $13,500 | | | | |
| 15 | | 1985 | $15,525 | | | | |
| 16 | | 1986 | $19,850 | | | | |
| 17 | | 1987 | $20,820 | | | | |
| 18 | | 1988 | $23,950 | | | | |

equal-sign key to force all columns to assume the size of the current column, and then press Y in response to the confirmation notice.

The first column alone is now too small. Use the LeftArrow key or press Shift LeftArrow to move the cursor to the first column. Then press the Spacebar until the *Width* prompt reads 16. Now press Insert to exit from the Column and Table Editor panel.

Note that while using the Column and Table Editor, you can place the cursor within the Column Indicators and use the Spacebar to add spaces to the column, and the Backspace or Delete keys to remove them. You can also type a number next to the *Width* prompt to change the column width. Hold down the Shift key and press Insert to add columns or press Shift Delete to join two columns.

Now let's put a border around the table. First press the BORDER key (Alt-F8); press it again to highlight the entire table, and then press Return. Move to the *Outside* prompt, press the Spacebar, and a box containing the border options will appear. Press DownArrow twice and press the Spacebar to select Double; then press Return. Note the appearance of a double line around the diagram in the center of the screen. Move to the *Inside* prompt, press S and then Return to use a single line within the table. Note again the change to the diagram. Press Insert to exit from the panel. The table now has the borders you specified.

Before entering the text for the column headings, make some additional changes to the columns and borders. Make sure the cursor is in the top row, press the TABLE key, and press Return. The cursor now appears on the second line of the screen in the Column and Table Editor. The prompt at the top right of the screen displays the cursor's position. Using it as a monitor, move the cursor to position 28. Press Shift Delete to combine the columns located on either side of the cursor. Press the Spacebar to add an additional space so that the combined column is the same width as the two columns below it. Then press Insert.

To make further changes, move the cursor to the first column on the second line and press the BORDER key (Alt-F8). Use the RightArrow key to extend the highlight over the entire row and press Return. Move to the *Top* prompt (not the *Top gutter* prompt), select None, move

## HOW TO SET UP THE STOCK-PRICE-ANALYSIS WORKSHEET

### 1. Default Settings

**Format:** Currency, 2

*1-2-3*: /Worksheet Global Format Currency, press Return
*Symph*: MENU Settings Format Currency, press Return, select Quit

### 2. Individual column widths

**A** 17

To set the width of column A, place the cell pointer in column A, select

*1-2-3*: /Worksheet Column Set-Width, enter 17
*Symph*: MENU Width Set, enter 17

### 3. Cell formats

| Format | Range |
|---|---|
| Percent 0 (*Symph*: %0) | E3..E7 |
| Fixed 0 | G3..G7 |
| Currency 0 | C10..C18 |
| General | B10..B18 |

For example, to set the format for range E3..E7, select

*1-2-3*: /Range Format Percent, enter a zero, specify range E3..E7
*Symph*: MENU Format %, enter a zero, specify range E3..E7

### 4. Labels

Enter as left-aligned all labels in column A, range B3..B7, and row 1 of the worksheet on this page. Then select / (*Symph*: MENU) Range Label Right and enter B1..G1 to right-align the labels in that range.

### 5. Values

Enter the values shown in the figure for the following ranges and cells: C3..D7, F3..F7, B10..B18, C10..C18.

### 6. Enter and copy formulas

| Cell | Formula |
|---|---|
| E3 | +D3/C3 − 1 |

Copy cell E3 to range E4..E7.

| Cell | Formula |
|---|---|
| G3 | +D3/F3 |

Copy cell G3 to range G4..G7.

### 7. Range names

| Name | Range |
|---|---|
| *prices* | A3..G7 |

To create the range named *Prices*, select / (*Symph*: MENU) Range Name Create, enter *prices*, and specify range A3..A7.

### 8. Graphs

*1-2-3*: Select /Graph Type Bar X, indicate range B10..B18, select A, and indicate range C10..C18. Select Options Titles First, enter *RETURN ON $10,000 INVESTMENT*, select Scale Skip, enter 2, select Scale Y-Scale Format Currency, enter 0, and select Quit Quit View to look at the graph. Press any key, select Save, enter *Returns*, and select Quit.

*Symph*: Select MENU Graph 1st-Settings Type Bar Range X, indicate range B10..B18, select A, indicate range C10..C18, select Quit Switch Titles First, enter *RETURN ON $10,000 INVESTMENT*, select Quit Other Skip, enter 2, select Y-Scale Format Currency, enter 0, select Quit Quit Preview, press any key to return to the worksheet, select Image-Save, enter *Returns*, and select Quit.

to the *Bottom* prompt, select Double, and press Insert. Observe the changes in the table's appearance. Next, move to the second column of the first row, press the BORDER key, and press Return. The *Bottom* setting is already set to Single, so just press Insert to create a single rule across the top of the two columns.

MANUSCRIPT LETS YOU PLACE TABLES AND GRAPHS ALMOST ANYWHERE IN A DOCUMENT AND RESIZE THEM AS YOU WISH.

Now enter the headings shown in figure 4 into the column headings of your document. Use the Arrow keys to jump to each blank column. The headings won't be centered as they are in the figure. To center them, move to the beginning or end of the first row, press the FORMAT key (F6), select Column, use the Arrow keys to highlight the entire row, and press Return. Move to the *Justification* prompt, press C for center; then press Insert to accept the change. Repeat the same procedure for the second row, and the headings will be centered.

You have now created a table that you can update whenever you change the data in your worksheet. To update the table, place the cursor in the second line of data. Press *Manuscript*'s DELETE key (Alt-F4), select Block, and press Return. You should now have a table with headings and only four lines of data. You can maintain the table's format and reimport the worksheet data by pressing MENU (F10) and selecting Tools Worksheet.

If the worksheet had more rows of data added to it since you last updated the document, the table would have automatically expanded to include the new rows. However, the converse isn't true: The program won't shrink the table if your updated worksheet has fewer rows than your table. Also, be aware that the program cannot import a table whose number of columns varies at all from the number of columns you defined in *Manuscript*. At this point, save your document table by pressing Control S.

*Manuscript*'s table structure makes it easy to move rows, columns, and individual entries within a table. To experiment with moving information, place the cursor in the second line of data, press the CUT key (F4), select Block, and press Return. Move the cursor to the first character of the last line of the table and press the PASTE key (F5) to insert the deleted line. You can also move single entries within the table by using the CUT and PASTE keys.

The TABLE key makes it easy to move whole columns of information within the table. Make sure the cursor is on the second line of the table or lower (just for clarity's sake), press the BORDER key twice, and then press Return. The cursor appears in the Column and Table Editor at the top of the screen. Move it to the second column, press Control ] by holding down the Control key and pressing the right-bracket key, and the current column will switch places with the column to the right. If you continue to press Control ], the column will continue to shift rightward. You can move columns to the left by pressing Control [. Refer to figure 4 to determine where in the table the columns originally appeared, and use Control ] or Control [ to return any moved columns to their original locations. When you finish, press Insert to leave the Column and Table Editor.

## EMBED GRAPHS WITHIN TEXT

You can use Marker commands to include graphics in your document. *Manuscript* can import graphics from a wide variety of sources, resize them, and move them around within the document. Let's import the graph that you have already created.

Begin by creating two new blocks that do not have the column structure of the existing table. Place the cursor at the end of the last line of the table and press Control O twice to create two new blocks with the default format. Press the MARKER key, type P four times to move the cursor to the Picture option on the Marker menu, and press Insert. Either type the drive name and file name (such as *c:\123\returns.pic*) and press Return, or use the gray plus-sign key to navigate to the directory containing the graph file you saved earlier. Highlight the graph file named RETURNS and press Return.

The *Position* prompt has three possible settings; press the Spacebar to see them. If you choose Fixed and the picture does not fit on a page, white space remains at the bottom of the original page, and the picture moves to the top of the next page. If you choose Floating and the picture does not fit on a page, the picture moves to the top of the next page, and succeeding text fills in the bottom of the original page. The In Text setting treats the graphic as a word. That setting might be appropriate for a logo you wish to include in your text. The graphic can be no larger than the height of a line of type. For our purposes, we won't use the *Height* and *Width* prompts, which are optionally used to override *Manuscript*'s automatic sizing of the graphic. For our purposes, we'll accept the default choice of Fixed, so press Return.

Press Insert to accept the default settings in the Picture menu. Now you'll see the picture marker [PIC RETURNS.PIC]. To preview the graphic, press MENU and select Print Preview Document. When you see the Preview Document Panel, press Insert (see figure 2). On the left side of the screen, you'll see a view of the entire page. At the top right is a magnified view of the portion of the page that is enclosed by a box. You can magnify different areas by moving the box with the Arrow keys. Paradoxically, you increase the magnification by pressing the gray minus-sign key and decrease it by pressing the gray plus-sign key.

To see a full-screen representation of the document, press MENU and select Content. Use the Arrow keys to move the image up a bit at a time; press PageDown to move down a full screen. Press MENU Full-Page to return to the previous display. After inspecting the document, press MENU, select Quit, and when you see the Preview Formatter panel, press any key to return to the text-editing screen.

IF IMPORTED DATA CHANGES, MANUSCRIPT CAN EASILY UPDATE YOUR DOCUMENT WITH THE LATEST DATA OR GRAPH.

## FINISHING TOUCHES

Now let's see how easy it is to rearrange your document. For example, you can reduce the size of the PIC image, place it within a column, and then add text or other graphics in a column next to it. Place the cursor on the carriage-return symbol (◄) to the right of the picture file name. Press the SPLIT key and select Column. To create two columns of equal width, press the TABLE key and then press Return. To set the first column to 39, press the UpArrow key, enter 1, press Return, enter 39, and press Return. To set the next column to the same size, press the DownArrow key, type an equal sign and a Y, and press Insert.

Move to the blank column you've created by pressing the RightArrow key twice. Enter the text that appears to the right of the graph in figure 4. To center the text vertically, relative to the graph, press the FORMAT key, select Block, and press Return. Move the cursor to the *Vertical centering* prompt (the second to the last line above the bottom of the Current Block Format panel), enter 50, and press Insert (see figure 3). Now press MENU, select Print Preview Document, and press Insert. When the document appears, you will see that *Manuscript* has automatically resized the graph and centered the text next to it.

If you decide that you need to shrink or expand the graph or the text, you can easily change either's size by using the TABLE key. For example, select MENU Quit to exit Print Preview. Then press the TABLE key, press Return, place the cursor in the second column, and press the Delete key or the Backspace key several times to decrease the column's size. You will see the lines of text shorten and the text rewrap to fit within the new space. To add spaces, press the Spacebar. Press Insert when the size is right.

If this were an actual report, you could now add the text for your stock analysis. For the purposes of this tutorial, though, you're finished modifying the document, so press Control S to save it. To print the document, press MENU and select Print Final. When you see the Print Document Panel, take a moment to review the settings it contains, and then press Insert to print the document (see figure 4). After the program finishes printing, it will beep and prompt you to press any key to return to the document editor. You can exit to the Document Manager by pressing MENU and selecting Quit, or you can simply press Control Q. To exit the program completely, select Quit from the Document Manager panel and press Insert.

*Manuscript* 2.1, a more recent upgrade, lets you import data from a single worksheet cell directly into your text, and it lets you shade columns and blocks to highlight information. The program also lets you import data from *1-2-3* Release 3. ■

### IN BRIEF

*Manuscript* Version 2.0. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 617-623-6572 for information (available through local dealers). Runs on the IBM PC XT, PC AT, PS/2, or compatible computers. Requires 512K RAM (640K recommended), a hard disk, a 5¼-inch or 3½-inch disk drive, and DOS 2.0 or higher. *Manuscipt* 2.0 released 5/88; *Manuscript* 2.1 released 5/89. $495. For registered 2.0 users, upgrade to 2.1 costs $20; for registered 1.0 users, it costs $75. 90-day warranty.

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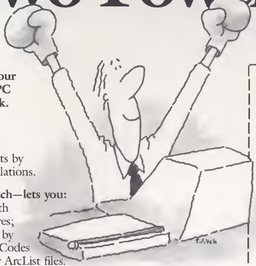

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# CHOOSE THE RIGHT ONE

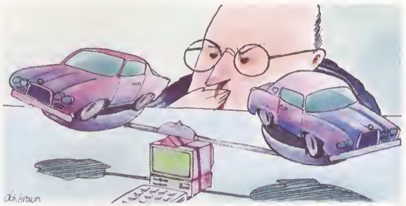
## With *Decision Pad* 1.2 you can weigh the features of competing alternatives.

BY DOUGLAS CHING

How often do you have to choose from a pool of almost-equally qualified applicants, or pick the best machine for your plant, or choose among several marketing programs? If you have to make important decisions, *Decision Pad* could prove a powerful ally.

This program lets you turn your preferences and assessments into numeric ratings, and then you can use those ratings to rank alternatives (see the screens, next page). If conditions change after you make your choice, you can use *Decision Pad* to determine the point at which an alternative should be chosen.

After you've made a choice, *Decision Pad* helps you anticipate and respond to criticism. For example, if you have chosen a particular investment strategy, it's easy to determine the underlying assumptions of those who disagree with your choice and to discuss objectively the available alternatives.



You could do this kind of work with *1-2-3* rather than with *Decision Pad*, but it wouldn't be easy. As alternatives and criteria grow in number, a *1-2-3*–based model would slow down and become mathematically complex. What's more, using intuition to assign numerical values and weights to criteria is not easy. For example, how do you weight education against experience?

*Decision Pad* handles such problems for you. It does the math and provides tools that make it easier to assign relative values and weights. After you do the setup work, in most cases it delivers answers in seconds. And if you have already created a *1-2-3* worksheet to rank alternatives, *Decision Pad* can import the relevant data into its own worksheet with a single command.

The product can also frustrate you in a number of ways. It takes time to set up a comparison in *Decision Pad*'s worksheet. The program provides no way to automate what-if analyses, which would make it easier to test your priorities and conclusions. And the program has one or two quirks that can slow you down.

A final caveat: Because *Decision Pad* ultimately makes its conclusions based on numbers, the program can discourage you from playing hunches. In fact, it will clearly spell out all the reasons to ignore your hunch. Only your own judgment can tell you when to follow the program and when to indulge your intuition.

### CHOOSING A COMPANY CAR

To understand how *Decision Pad* works, let's suppose your manager asks you to pick the car model your company should buy for its fleet. Assume that she has already done enough research to know that she's interested in four cars, which we'll call Wonder Wagon, Cheetah, Miler, and Road King. You know the cars will be used heavily, so you infer that, in addition to purchase price, you should value comfort, fuel economy, and dependability. Furthermore, you learn through the grapevine that the president slightly favors the Road King.

You first consult a popular consumer magazine to gather information. In it you find a host of test results for each car, as well as results for other cars in the same class. Now you're ready to use *Decision Pad*. As you enter the various models and their test results, the program automatically arranges the data into a table.

Next, you assign a value, or a score, to each criterion. The magazine presents some criteria, such as cost and mileage, numerically. A higher mileage rating should be given a higher score. Conversely, a higher cost should receive a lower score. *Decision Pad* lets you easily specify both relationships through the program's predefined menu choices.

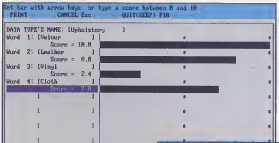
The magazine offers qualitative ratings of other features. For example, it rates each car's repair record as excellent, very good, good, fair, or poor. *Decision Pad* gives you several ways to turn such ratings into numbers. You can let the program automatically rank ratings from excellent to poor on a scale of 1 to 10. If you decide that any rating deserves a higher or lower score, you can manually adjust the scale.

Or you can score criteria graphically. According to the program users whom I interviewed, that feature is especially useful for scoring subjective preferences.

---

*Douglas Ching is a financial analyst for a leading national health-care company.*

DON BROWN



```
Set bar with arrow keys, or type a score between 0 and 10
 PRINT ─────── CANCEL Esc ─────── QUIT(KEEP) F10 ───

DATA TYPE'S NAME: [Upholstery      ]
Word  1: [Velour          ]
              Score = 10.0
Word  2: [Leather         ]
              Score =  8.0
Word  3: [Vinyl           ]
              Score =  2.4
Word  4: [Cloth           ]
              Score =  7.0
         [                ]

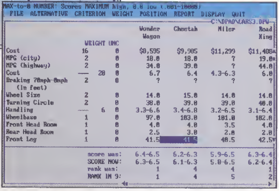
         [                ]

         [                ]

         [                ]

         [                ]

         [                ]
```



```
MAX-to-0 NUMBER: Scores MAXIMUM high, 0.0 low (.001-10000)
 FILE  ALTERNATIVE  CRITERION  WEIGHT  POSITION  REPORT  DISPLAY  QUIT
                                                    ─C:\DPAD\CARS3.DPW─
                                     Wonder     Cheetah      Miler       Road
                                     Wagon                               King
                     WEIGHT UNC
Cost                   16       0    $8,595     $9,905     $11,299    $11,408
MPG (city)              2       0      18.0       18.0           ?       19.0
MPG (highway)           2       0      34.0       39.0           ?       44.0
Cost                   ──   20  0       6.7        6.4     4.3-6.3        6.0
Braking 70mph-0mph      2       0         ?          ?           ?          ?
   (In feet)
Wheel Size              2       0      14.0       15.0        14.0       14.0
Turning Circle          2       0      38.0       39.0        39.0       40.0
Handling               ──    6  0   3.3-6.6    3.4-6.8     3.2-6.5    3.1-6.4
Wheelbase               1       0      97.0      103.0       101.0      102.0
Front Head Room         1       0       4.0        4.0         3.5        4.0
Rear Head Room          1       0       2.5        3.0         2.0        2.0
Front Leg               1       0      41.5       41.5        40.5       42.5

                    score was:      6.4-6.5    6.2-6.3     5.9-6.5    6.3-6.4
                    SCORE NOW:      6.3-6.5    6.1-6.3     5.8-6.5    6.2-6.4
                    rank was:             1          4           4          1
                    RANK IN 9:            1          4           5          2
```

**The lower section of *Decision Pad*'s worksheet display (below) shows current scores and rankings, as well as the scores and rankings prior to the latest change to the worksheet. The program lets you compare and score subjective criteria (left) by adjusting a bar graph.**

Suppose, for instance, that each car is available with a leather, vinyl, cloth, or velour interior. *Decision Pad* lets you create a graph containing a bar for each type of interior. You can lengthen or shorten a bar in comparison with the others ("I like velour *this much more* than leather.") and the program will generate a numerical score. Users also found that scoring all preferences at once like this helped them to keep each score in perspective.

If you need data not supplied by the magazine you consulted, you might visit car dealers yourself. To help you record what you learn, *Decision Pad* will, for each alternative, print a form that you can take with you.

## WEIGHTS AND WHAT-IF

Once you score the criteria, you weight each one to reflect your priorities. You can assign weights either numerically or graphically, just as you can with values. You can assign a weight to each criterion or break the criteria into subgroups and assign a weight to each subgroup.

For example, if you were to weight list price and mileage separately, you might mistakenly assign the list price a higher weight, even though mileage contributes to overall cost of the car. If you combine them into a subgroup, you can still rank those items separately, but you ensure that the overall cost is what you evaluate, not just one component of that cost.

Although building a model takes time, you can change the data it contains as easily as you can in a *1-2-3* worksheet. For example, by experimenting with a few weights in the model, you can show the president that his favorite car is the best choice only if cost is half as important as you originally determined.

Unfortunately, *Decision Pad* gives you neither a way to automate such what-if analysis nor a macro language to let you implement the automation yourself. That's a shame, because if you work with variable criteria, automated what-if analysis makes it easier to identify the precise point at which one alternative becomes better than another.

For example, suppose your worksheet determines that the Wonder Wagon is the best alternative if each car sells at its suggested retail price. After further research, however, you learn that Miler prices vary significantly from one dealership to another, so you want to know the price at which the Miler becomes the best choice. With *Decision Pad* you'll have to keep entering new prices until the program ranks the Miler first, then work backward to find the exact dollar figure that puts the Miler on top. It would save time if you could specify a goal and let the program repeat the what-if test until it found the result.

You can use two of the program's 12 predefined reports to complement manual what-if testing. One report records up to 12 what-if tests and then summarizes both the assumptions and the results of each test.

Another report generates a sensitivity analysis for your model. First it doubles the value of the weight assigned to the most heavily weighted criterion or criteria group. Then it tests each criterion with each of six weights equally spaced between zero and that doubled value. For example, if your most heavily weighted criterion is weighted 20, this report would test every criterion for the weights 0, 8, 16, 24, 32, and 40.

## THINGS TO WATCH FOR

*Decision Pad*'s method of handling missing information can deceive you. For example, if you don't have a value for a criterion for one of the cars, the program displays a question mark in that space and scores that criterion as the range between the lowest and highest scores given to other cars for that criterion. The program then determines the car's total score as a range between the lowest and highest possible total scores.

According to the tutorial that comes along with the program, if that car's low-

### UNDERSTANDING WEIGHTED AVERAGES

*Decision Pad* uses the weighted average of each alternative's valued criteria to determine which alternative is best. Many high schools use the same method when they rank students by grade point average (GPA). First, the school assigns a value to each grade: An A is worth 4 points; an A–, 3.7 points; a B+, 3.3 points, and so on. Then the school assigns a weight to each course to indicate its difficulty and multiplies the grade by that weight. For example, college-level courses may get a weight of 1.5; college-prep courses, a weight of 1.25; and standard high school courses, a weight of 1.

Finally, the school takes an average of each student's grades and ranks each student based on his or her average. If the school totaled each student's points without weighting them, a student who got straight A's in easier courses would be ranked as high as a student who got the same grades in more-difficult courses. The weight and ranking help the college choose among students who perform best in the most advanced courses.

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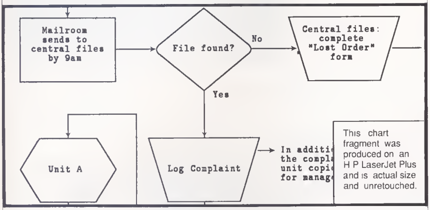
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est possible total score is higher than all the other cars' highest possible scores, "you now have enough data to show a winner," and you "may be wasting effort to fill in any remaining question marks" in your worksheet. However, if you enter a value well outside the range of values assigned to other cars for that criterion, you could easily get a result different from the one suggested by the program. A *Decision Pad* product-support representative recommended setting the range of scores manually rather than letting the program set the range by default, as described above.

Most smaller models recalculate instantaneously. However, several of the users to whom I spoke said that as you add more values that are greater than 10,000 to the worksheet, *Decision Pad* slows. In my tests on a 10 MHz 80286-based computer, a worksheet made up of 77 six-digit numbers recalculated instantaneously. A worksheet four times that size took about two seconds.

*Decision Pad* has several hot keys, but none for the command sequences you use most. Particularly helpful would be hot keys for adding and deleting a criterion or alternative. You perform these tasks constantly, and each requires at least four keystrokes.

If you have pertinent data stored in a *1-2-3* worksheet, you may be able to use another program from the same manufacturer, *Smart Import*, rather than reenter data into *Decision Pad*. As long as the column and row headings in your *1-2-3* worksheet are the same as the names of criteria and alternatives in your *Decision Pad* worksheet, *Smart Import* will import the data where it belongs. Note that if you format a criterion in *Decision Pad*, *Smart Import* will import into that criterion row only data in the same format. Although it's a well-designed feature, most users to whom I spoke don't use *Smart Import*. It seems once they begin using *Decision Pad*, they no longer need to keep such data in *1-2-3*. ■

**IN BRIEF**

*Decision Pad* 1.2. Apian Software, P.O Box 1244, Menlo Park, CA, 94026; 800-237-4565. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and 256K of RAM (384K recommended). Released 12/88. $195; $10 for demo disk; $45 for *Smart Import*. 90-day warranty against defective media.

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| Linked values in formulas | YES | no | YES |
| Automatic chained linking | no | no | YES |
| See two sheets on screen | YES | no | YES |
| Cut & paste between sheets | YES | no | YES |
| Point-and-shoot link setup | YES | no | YES |
| Automatic consolidation | YES | no | YES |
| Hierarchical consolidation | no | no | YES |

*Release 3 is two to three times slower than Release 2.01 in PC Magazine benchmarks. (9/12/89 issue.) It needs lots of memory, lots of hard disk space, and does not support Release 2 add-ins. Expanded memory cards must be re-configured.

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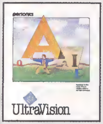

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3 Fair ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
4 Poor ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
5 N/A ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

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# THREE WAYS TO RUN TWO PROGRAMS AT ONCE

## *Software Carousel, Desqview,* and *Microsoft Windows*

BY TOM CARLTON AND R. MARTIN TEMPLE

Do you wish you could switch from one program to another and back again without the need to restart your application? Would you save time if you were able to work with one application while another works on a lengthy task behind the scenes?

If you answer yes to one or both of these questions, then you can benefit from a program that lets your computer keep more than one application in memory, or from a program that lets those applications work concurrently.

One way that you can reap these benefits is to use OS/2. But very few applications run under OS/2, and to use that system, you need an 80286- or 80386-based computer and at least 2 megabytes of memory. True, you can run DOS applications in OS/2's compatibility box, but it offers less available memory than running under DOS, and you can't do multitasking.

*Software Carousel*, *Desqview*, and *Microsoft Windows* each offer a better alternative. All three let you load several applications into memory and switch among them with one or two keystrokes or, in the case of *Windows*, a click of the mouse. *Desqview* and *Windows* also let two or more of your applications work at the same time. With them, you can type a letter with your word processor while your spreadsheet recalculates.

If you want only to switch among applications and you don't have expanded or extended memory, choose *Software Carousel* ($89.95). This program is the easiest of the three to install and leaves the largest amount of RAM free for your applications. But if you have expanded memory that conforms to the Lotus/Intel/Microsoft Expanded Memory Specification (LIM-EMS) 4.0, *Desqview* ($129.95) will use it to give you even more room for your applications. If you have an 80386-based computer with extended memory, *Desqview 386* ($189.90) will make the most of that system.

If you want two or more applications to process data at the same time, you must choose between *Desqview* and *Windows* ($99 for *Windows/286*; $195 for *Windows/386*). Both programs will let you run applications concurrently on an 80386-based computer, but *Desqview* is best for this task because it requires much less memory and disk space to get the job done. *Windows* is best if you want to run programs that are specifically designed to run in *Windows*, such as *Aldus PageMaker* and *Draw Plus*.

*Windows* allows multitasking on 80286-based computers, but only with applications written specifically for *Windows*. *Desqview* lets you run applications concurrently on a properly configured 8088 or 80286-based computer. However, many computers can't be configured as necessary, and even if yours can, it usually takes a hardware specialist to do it.

Unlike *Software Carousel*, both *Desqview* and *Windows* allow you to display more than one of your applications at a time. *Desqview* and *Windows* also let you cut and paste data from one application to the other. To do the same while working in *Software Carousel*, you have to purchase another program, *Magic Mirror* ($99.95), from the same publisher.

If your only need is to switch among *1-2-3* worksheets without constantly saving and retrieving them, these programs offer more than you need. Try *Flash-In* (PC Publishing, 800-634-4555, reviewed in the October 1988 issue). With this add-in, you can view two worksheets at once and transfer data between them.

### SOFTWARE CAROUSEL

Suppose you use *Software Carousel* to load *1-2-3* and *dBase IV* into separate windows and you then start working in *1-2-3*. With a couple of keystrokes, you can switch to *dBase IV*. With two more

---

*Tom Carlton, a manager of corporate business analysis, and R. Martin Temple, a PC decision support consultant, work at a midwestern Fortune 500 company.*

DON BROWN

keystrokes, you can return to *1-2-3* and the file you were working on, exactly as you left it.

In our tests on an 80386-based computer using expanded memory, *Software Carousel* took less than one second to switch from one program to another. On an 8088-based laptop without extra memory, the same switch took 23 seconds. Remember, however, that no matter how long it takes *Software Carousel* to switch among your programs, it will always be much faster than saving your current file, leaving your current program, loading another program, and loading another file.

*Software Carousel* lets you switch among as many as 12 programs, depending on the amount of extra memory or free disk space you have. The program occupies 29K of memory on an 8088-based computer without expanded memory. That means you can have a maximum of 555K available for running each of your programs. *Software Carousel* uses only 11K of conventional memory. The rest is stored in expanded or extended memory on computers that have either kind.

Some terminate-and-stay-resident (TSR) programs, such as *SideKick*, can cause your computer to crash if you load them before you load *Software Carousel*. *Software Carousel*'s manual recommends that any TSR you run be loaded after *Software Carousel*, making that TSR one of the programs that *Software Carousel* switches among. That approach, however, can reduce the utility of some TSRs. For example, if you switch to and from *SideKick* this way you can't use its facility for cutting and pasting between applications.

## DESQVIEW

You can switch among as many as 55 applications with *Desqview*, memory and disk space permitting. You can display each of your applications on screen at the same time in separate windows, although some applications require a full-screen window when in use. You can change the size and position of these windows in any way you like.

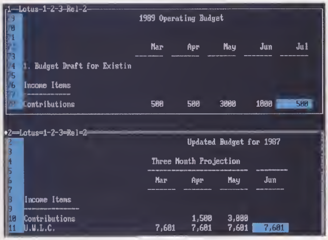
When you use *Desqview*, the amount of memory available for each application depends on your equipment. In particular, if you have expanded memory that conforms to the LIM-EMS 4.0, you'll have a lot more memory to work with. On a computer without expanded or extended memory, *Desqview* leaves a maximum of about 435K for each application—more than 100K less than *Software Carousel* allots to each application. If you have expanded memory that conforms to the LIM-EMS 4.0, *Desqview* can increase that space by 100K or more.

To gain even more space for your applications running under *Desqview*, you can use DOS 3.1 or lower; use a CGA, monochrome, or Hercules display adapter; and set your CONFIG.SYS file for 15 buffers or fewer. The more of these things you do, the more memory for your applications. In our tests on an 8088-based computer with expanded memory that conforms to LIM-EMS 4.0, a monochrome monitor, and DOS 3.1, *Desqview* allotted more than 600K for each application.

The same holds true for *Desqview 386*, which comes with a program that converts an 80386-based computer's extended memory to LIM 4.0 expanded memory. By way of this conversion and some other efficiencies, *Desqview* 386 can give you as much as 610K for each application, provided you are not using an EGA or VGA. In our tests, however, it allotted 526K. Our 80386-based computer uses DOS 3.3, a VGA, a disk-cache program, a mouse driver, and a CONFIG.SYS file set for 20 buffers.

We tested *1-2-3*, *Microsoft Word*, *dBase IV*, DOS, and *Crosstalk XVI* with *Desqview*, and each program worked quite well. However, we could not set up the popular communications program *Crosstalk* to work in the background. Nor could we set up *Microsoft Word* to work in its graphics mode. It worked only in text mode.

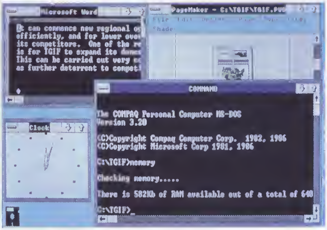
If you have an 80386-based computer with at least 2 megabytes of memory, *Desqview* lets you run two or more applications concurrently. The program also lets you run applications concurrently on an 8088- or 80286-based computer, but to work well in that mode, the computer must meet two presumptuous requirements. First, the computer must have LIM-EMS 4.0 expanded memory. Second, you must disable the computer's RAM, preferably to 64K. You can do this to an IBM computer, but many clones don't allow it. Even if your computer does, dis-



```
1—Lotus-1-2-3-Rel-2—
 9                                1989 Operating Budget
10
11
12                                  Mar      Apr      May      Jun      Jul
13                                -------  -------  -------  -------  -------
14  1. Budget Draft for Existin
15
16  Income Items
17  ------------
18  Contributions                   500      500     3000     1000      500

•2=Lotus=1-2-3=Rel=2
 2                                        Updated Budget for 1987
 3
 4                                 Three Month Projection
 5                               -------------------------   -------
 6                                 Mar      Apr      May       Jun
 7                               -------  -------  -------   -------
 8  Income Items
 9  ------------
10  Contributions                          1,500    3,000
11  U.W.L.C.                      7,601    7,601    7,601     7,601
```

These are two *1-2-3* worksheets running at the same time in *Desqview*; the bottom window is active. *Desqview* can be set to display *1-2-3*'s control panel and cursor, no matter what size window you specify for *1-2-3*. You can cut and paste between windows.



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The COMPAQ Personal Computer MS-DOS
Version 3.20

(C)Copyright Compaq Computer Corp.  1982, 1986
(C)Copyright Microsoft Corp 1981, 1986

C:\TGIF>memory

Checking memory.....

There is 582Kb of RAM available out of a total of 640

C:\TGIF>_
```

*Windows*' Macintosh-like interface lets you use a mouse or your keyboard to resize windows and switch between applications. Applications designed specially for *Windows* offer pull-down menus and simple cut-and-paste data transfer.

abling memory is a job beyond most people's expertise.

The 80286-based computer we used, a CompuAdd 286-10, met neither of these requirements—we could disable its memory only to 512K, and the older model Intel Above Board with which it is equipped did not conform to LIM-EMS 4.0. *Desqview* was able to run applications concurrently on this computer, but those applications had to share 435K of memory. That allowed us to run *1-2-3* together with *Crosstalk XVI* because those programs require a minimum of 200K and 128K, respectively. However, we could not run programs such as *Microsoft Word* (384K minimum) or *dBase IV* (640K minimum) concurrently with any other programs.

*Desqview*'s install program is easy to use, but it doesn't always perform as promised. The install program searches your hard disk for certain popular applications, such as *1-2-3* or *Microsoft Word*. For every such program it finds, it creates a special program-information file (PIF) containing that program's memory requirements, menu keys, display mode, startup command, and other important characteristics.

On one of the computers we used, *Desqview*'s install program set up a PIF for *Sidekick*, which was not on the hard disk, and did not set up a PIF for *dBase IV*, which was. In many cases, the install program set up a PIF for an earlier version of the application in question, and it was necessary for us to modify the PIF before the application would work with *Desqview*.

Our troubles jibe with the collective experience of the *Desqview* users we interviewed. Some had no problems and love the product, while others, plagued with installation problems and crashes, have never been able to get *Desqview* to work to their satisfaction.

### MICROSOFT WINDOWS

If you plan to run *Windows* applications, such as *Aldus PageMaker* or *Microsoft Excel*, then *Windows* is the obvious choice for you. Applications that are designed to run under *Windows* boast such features as pull-down menus, mouse support, and easy cutting and pasting between applications.

You need 1.5 megabytes of free disk space to install *Windows/286*, compared with 392K for *Desqview*. Microsoft recommends a minimum of 512K of RAM to run the program, but you may need a lot more. In our tests, to install *Windows/286* to run *1-2-3* on our 80286-based computer with 2 megabytes of memory required one and a half hours of assistance from a Microsoft technical-support representative.

If you want to run two sizeable DOS applications concurrently, you need an 80386-based computer, *Windows/386*, 2 megabytes of free disk space, and 3 megabytes of RAM (*not* the 2 megabytes recommended by the company). However, *Windows/386* is easier to install than its 80286-based counterpart. It took a surprisingly uneventful eight minutes to set up *Windows/386* on our 80386-based computer.

Like *Desqview*, *Windows* comes with PIFs for popular programs, and like *Desqview*, some of its PIFs were out of date and required adjustment. *1-2-3*, *Microsoft Word*, *dBase IV*, and DOS worked well under *Windows* in our tests. As with *Desqview*, under *Windows* we could not get *Crosstalk XVI* to work in the background, but we did get *Microsoft Word* to run in graphics mode without adversely affecting any other programs. ■

### IN BRIEF

*Microsoft Windows/286* Version 2.11 and *Microsoft Windows/386* Version 2.1. Microsoft Corp., 16011 Northeast 36th Way, Box 97017, Redmond, WA 98073-9717; 206-882-8080. Runs on the IBM PC AT, PS/2, Compaq Deskpro 386, and compatible computers. Requires 512K of RAM or 2 MB for *Windows/386*, DOS 2.0 or higher, and a graphics display adapter. Released 7/88. $99 for *Windows/286*, $195 for *Windows/386*. 90-day warranty.

*Desqview* Version 2.25 and *Desqview 386* Version 1.0. Quarterdeck Office Systems, 150 Pico Blvd., Santa Monica, CA 90405; 213-392-9851. Runs on the IBM PC AT, PS/2, Compaq Deskpro 386, and compatible computers. Requires 512K of RAM and DOS 2.0 or higher Released 11/88. $129.95 for *Desqview* and $189.90 for *Desqview 386*. 90-day defective-disk warranty.

*Software Carousel* Version 3.00. SoftLogic Solutions Inc. One Perimeter Rd., Manchester, NH 03103; 800-272-9900, in N.H. 603-627-9900. Runs on the IBM PC AT, PS/2, Compaq Deskpro 386, and compatible computers. Requires 192K of RAM and DOS 2.0 or higher. Released 3/89. $89.95. 30-day, money-back warranty when purchased from manufacturer; 90-day defective-disk warranty.

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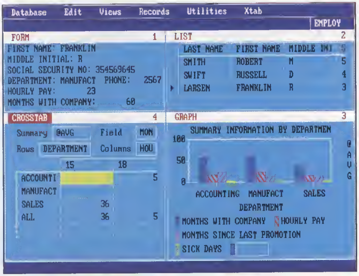
# Reflex 2.0: Interactive Graphics and Larger-Capacity Files

In 1985, *Reflex*, a single-file database program, took a unique tack by offering a host of analytical tools to database users. Among those tools were graphs, cross tabulation, and simultaneous multiple views of your data. If you had trouble using *1-2-3*'s database, *Reflex* presented a very good alternative.

Now *Reflex* 2.0 adds entirely new functions and enhances many of its predecessor's features.



FIRST NAME: FRANKLIN
MIDDLE INITIAL: R
SOCIAL SECURITY NO: 354569645
DEPARTMENT: MANUFACT PHONE: 2567
HOURLY PAY: 23
MONTHS WITH COMPANY: 60

| | LAST NAME | FIRST NAME | MIDDLE INI | |
|---|---|---|---|---|
| | SMITH | ROBERT | M | 5 |
| | SWIFT | RUSSELL | D | 4 |
| ▸ | LARSEN | FRANKLIN | R | 3 |

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| ACCOUNTI | | 5 |
| MANUFACT | | |
| SALES | 36 | |
| ALL | 36 | 5 |

Multiple views are updated automatically to reflect changes in your data.

The new features include the capacity for memos as long as 8,000 characters and for database files as large as 32 megabytes. A new editor has a search-and-replace command that lets you edit text in *Reflex* or in external ASCII files. *Reflex* 2.0 also saves your database files automatically, and it lets you print one, two, or three mailing labels across a page, or lets you design your own format.

Using its new mail-merge facility, you can write a form letter, then specify different combinations of paragraphs to go to different recipients. For example, suppose you want to use a standard set of opening and closing paragraphs for all recipients of a sales letter. For recipients whose database records show past purchases of more than $1,000, however, you can include paragraphs that offer premium merchandise. And for those whose records show past purchases of less than $1,000, you can include paragraphs that offer less-expensive products.

This version of *Reflex* enhances some of the innovative features of previous versions. While older versions let you display views of your data as a graph, table, or cross tabulation, you could define only one view of each type. If you wanted to define a second graph, you lost your first one. In *Reflex* 2.0 you can define and save multiple views of each type.

The program automatically updates each view, such as a graph, when you change its underlying data. It also displays graphs in a higher resolution than the previous versions did. It lets you display up to five windows at a time, accommodates larger cross tabulations (800 rows by 800 columns), displays your work in color, and eliminates the need to run a separate program to print graphs, create reports, and translate files. You can now select subsets of other files, including worksheets, to import into *Reflex*. And you can export data to other file formats as well. The new version also offers you a broader range of *1-2-3*–like @functions. You can graph the result of a formula or add formulas to a cross tabulation.

*Reflex 2.0*'s cross tabulations can be used to create summaries. If you're working with a personnel database, for example, and want to see salary totals by department, a cross tabulation displays those totals, and it automatically updates them if you make changes. Windows containing cross tabulations can now share the screen with other windows.

You can quickly sort your database on up to five fields at a time. Afterward, you can instruct *Reflex* to preserve the order of your sort while you conduct subsequent sorts. In the aggregate, this system lets you sort on as many fields as you wish. You can also show only those records that meet specific criteria. For example, you might want to show only the records for employees with the job title accountant.

You can print any view of your data that *Reflex* can display. If you're in a hurry, *Reflex* will quickly generate a tabular report, or you can design your own report that can include headers, footers, summary lines, statistical summaries, and

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fields consisting of calculations.

A mail-merge facility not only lets you merge database records into form letters, but it also functions as a simple word processor. You can use this facility to enter data and to review records through a form of your own design.

You can exchange data between *Reflex* 2.0 and *1-2-3* Release 1A, 2, and 2.01; *Symphony* 1.0 and 1.1; *dBase II, III, III Plus*, and *IV*; *Paradox*; and any other programs that read ASCII files.

*—Bill Lawrence*

*Reflex* 2.0, Borland International, 1800 Green Hills Rd., P.O. Box 660001, Scotts Valley, CA 95066-0001; 408-438-5300. Runs on the IBM PC, PS/2, and compatible computers. Requires a CGA or EGA card, or a VGA or Hercules display adapter; 512K of RAM; and a hard disk with a minimum of 3 megabytes of available memory. Released 6/89. $249; upgrade from previous versions of *Reflex* to *Reflex* 2.0, $75.
CIRCLE 1 ON READER SERVICE CARD

## BUSINESS, FINANCE

### 1-2-3 Forecasting Add-in for General Business Use

*Tomorrow* is an easy-to-use forecasting program for those who know nothing about forecasting techniques. Working directly from the spreadsheet, you can simultaneously make multiple time-series forecasts. For example, you can project next year's sales simultaneously for three salespeople. On-line help screens provide tutorials for using built-in options, such as seasonality adjustments and MAPE (mean absolute percentage error) analysis.

Requires *1-2-3* Release 2/2.01 or 2.2 and uses 55K of RAM. $129.95, from Isogon Corp., 330 Seventh Ave., New York, NY 10001; 800-662-6036.
CIRCLE 2 ON READER SERVICE CARD

### Develop and Test Ad Campaigns

*Advertising Edge* guides you through the basic tasks involved in developing a successful print or television ad campaign for any product or service. The software helps you target your customer, write suitable headlines, create the right product visuals, and more. Another feature lets you rate the ad you've developed and gives you a threshold score for running it. The rating feature also points out your ad's weak areas. The program includes an on-line tutorial, which uses as an example the development of an ad campaign for a personal computer. The software does not give advice about the placement of your ads.

Requires *1-2-3* Release 2/2.01, 2.2, or 3 and uses 35K of RAM. $109 U.S. and Canada; $149 international, from Successware, 203 Annandale Dr., Cary, NC 27511; 919-469-0119.
CIRCLE 3 ON READER SERVICE CARD

## TABLE UTILITIES

### Reorganize, Manipulate, and Calculate Worksheet Tables

*TableTalk*, a *1-2-3* and *Symphony* add-in, lets you perform a variety of useful operations on any size table in your worksheet. Without corrupting the data, you can move and reshape tables. For example, you can recast a 4-column by 3-row table into a 2-column by 6-row table. You can manipulate one table of data at a time by such methods as comparing it with another table or by comparing elements of each; by swapping, flipping, copying, and shifting data within a table without moving the table; by combining a set of data with another set; by using an index to extract data; by switching all the signs within a table, by using criteria to fill a data table; and more. You can perform calculations on a table, such as adding, dividing, multiplying, or subtracting a constant, and you can perform basic matrix-algebra operations, such as converting a row or column into a diagonal, summing the values on a diagonal, and generating unit and zero matrices.

Requires *1-2-3* Release 2/2.01, 2.2, or 3 or any release of *Symphony* and uses 30K of RAM. $79.95, from IRG Information Systems, 100 North Country Rd., Setauket, NY 11733; 516-689-7682.
CIRCLE 4 ON READER SERVICE CARD

### Spruce up Worksheet Tables, Export Them to Word Processors

*Refine* lets you reformat worksheet-based financial tables so that they're easier to read, save them as ASCII files, and then import them into any word processor that reads ASCII files. You can also export the reformatted table in a *WordPerfect* 4.2 file format, replacing spaces with tabs if you wish, and then use the word processor's proportional fonts in the table. You can make such formatting changes as placing currency signs outside parentheses in negative numbers, automatically inserting and aligning currency or other symbols next to the first and last numbers in a column and next to any total, and changing zero values to dashes or other symbols. A search-and-replace screen allows you to simultaneously perform up to 20 operations on the table. The utility handles tables that are any length and 255 characters wide.

MARTY BRAUN

Runs on the IBM PC, PS/2, and compatible computers and uses 182K of RAM. $79, from Refine Software, P.O. Box 34027, Bartlett, TN 38181; 901-385-1940.
CIRCLE 5 ON READER SERVICE CARD

## OTHER UTILITIES

### Three Ways to Gain Memory On a PC with 640K of RAM

*Memory Master* includes four sets of programs that help you eke out more conventional memory from your PC. *EDOS* has a special text-display driver for all versions of *Symphony* and *1-2-3* except Release 3 and lets you add 96K of RAM for text-based applications on PCs that have EGA or VGA video systems. *EEMRAM* supports text and graphics and adds 96K of RAM to PCs with EEMS and LIM-EMS 4.0 boards, but does not work with the Intel Above Board. *Memory Master* has utilities that let you run Borland's *SideKick* and *SideKick Plus*, Microlytic's *Gofer*, and Micro Logic Corp's *Tornado*, using about 9K of RAM for each of them. The software lets you swap applications that have an exit-to-DOS feature with each other, then reloads the original application. You can use *Memory Master* on a LAN.

Runs on the IBM PC, PS/2, and compatible computers with 640K of RAM and uses 2K of RAM. $49.95, from Vericomp, P.O. Box 23360, San Diego, CA 92123; 800-876-0400.
CIRCLE 6 ON READER SERVICE CARD

### Applications-Memory Manager

While you are using an application with an exit-to-DOS feature, such as *1-2-3, WordPerfect, Microsoft Word*, or *dBase*,

MARTY BRAUN

*AutoSwap* lets you load into RAM any other application with an exit-to-DOS feature. The utility moves the original application's memory into either expanded memory (LIM-EMS 3.2 and higher), extended memory, or to a hard disk. When you choose, you can return to the original application. *AutoSwap* will not swap with any terminate-and-stay-resident program, nor will it swap with *Xerox Ventura Publisher* 2.0. A network version is available.

Runs on the IBM PC, PS/2, and compatible computers and uses 5K of RAM when it's utilized, none when it's not. $49 for the single-user version, $199 for either the LAN version or run-time version, from The Lambda Group, 555 DeHaro St., San Francisco, CA 94107; 415-626-4545.

CIRCLE 7 ON READER SERVICE CARD

### Link 1-2-3 or dBase Files to Your Word Processor

*Slice Cut 'n' Paste* lets you view and bring selected portions of a *1-2-3* or *dBase* file into any word processor. The program also expedites the transfer of data between *dBase* and *1-2-3* without changing the original data in the spreadsheet or database file. The pop-up utility lets you use selection criteria and create a template file for frequently imported or exported data. A feature lets you capture any text screen and convert it to a WKS or *dBase* file format. The program lets you select fields in *1-2-3* or *dBase* and then automatically converts them into mail-merge formats for recent versions of *WordPerfect, Microsoft Word, WordStar, PC-Write*, and *IBM Displaywrite*.

Runs on the IBM PC, PS/2, and compatible computers and uses 65K of RAM. $99, from LightningWord Corp., 1601 Civic Center Dr., Suite 206, Santa Clara, CA 95050; 800-426-4381, in Calif. 408-241-1990.

CIRCLE 8 ON READER SERVICE CARD

### Archive Revised Worksheets

*WAS—The Worksheet Archive System*, is designed for those who need to compare multiple versions of a worksheet. The program stores only the differences between versions, making it easy to compare sheets and identify errors. The software tracks global settings, as well as individual cells. You can also compare your current worksheet with any archived version. You can add a new version, retrieve any version, and delete the most recent version of an archived sheet.

Requires *1-2-3* Release 2/2.01 and uses 256K of RAM. $49.95, from TRM Computers, 2106 Arborview, Ann Arbor, MI 48103; 313-994-6289.

CIRCLE 9 ON READER SERVICE CARD

### Accelerate Output Rate From Your PC to Your Printer

*ACTFast* is a pop-up program with a "hot key" that lets you send data from many applications to your printer at a baud rate of 38,400. The program accelerates the transmission of serial-port data from a baud rate of 9,600 to 38,400 baud if your printer accepts this higher rate. It works with all releases of *1-2-3* (but not with PrintGraph files), *Lotus Freelance Plus, Lotus Graphwriter II*, and most graphics and CAD applications. However, there are applications for which there are hot-key contentions, so check with the manufacturer before you buy. The software is compatible with LANs.

Runs on the IBM PC, PS/2, and compatible computers and uses 100K of RAM when operating, 2K when running in the background. $69.95, from Applied Creative Technology, 8333 Douglas Ave., Suite 700, Dallas, TX 75225; 800-433-5373, in Tex. 214-739-4200.

CIRCLE 10 ON READER SERVICE CARD

## OTHER SOFTWARE

### Link Laboratory Instruments Through 1-2-3 and Measure

*LabPro Automation Management System* is a series of macro-driven *1-2-3*–based programs that let you pull data from a variety of laboratory instruments into *1-2-3* with the help of National Instruments Corp.'s *Measure* and other Lab Systems software interfaces. The instruments that are supported and the prices for the available Lab Systems software interfaces include the Mettler PE and PM balances ($350), HP 3390A integrator ($350), Perkin Elmer Lambda 3 UV-Vis spectrophotometer ($350), Horiba F-16 pH meter ($450), Sartorius balances ($350), Symbol Technologies' bar-code scanner ($350), and Cavro syringe pumps ($450). *Multi-Instrument Data Manager* ($1,600) lets you control and combine data in a worksheet from eight separate instruments. The data is transmitted through the SFA Programmable Port Expander. The port expanders can be connected in a series to add more than eight instruments. The SFA Programmable Event Controller interface ($600) lets you control timed events in the laboratory. The *LabPro Sample Tracker* ($1,400) lets you use input from Symbol Technologies' bar-code scanner to track samples.

Requires *1-2-3* Release 2.2 and National Instruments Corp.'s *Measure* ($495). From Lab Systems, 55 Wheeler St., Cambridge, MA 02138; 617-868-8582.

CIRCLE 11 ON READER SERVICE CARD

## TRAINING

### 1-2-3 Release 3 Training for Beginners and Advanced Users

Teacher in a Box provides two levels of training for *1-2-3* Release 3 users. Each course consists of a workbook, a disk that contains examples, and six 45-minute lessons on three audio tapes. The courses feature built-in common errors that you learn to correct. Level I teaches you how to construct and manipulate Release 3's 3-D worksheets, how to use Quick Graph, how to display consecutive worksheets, how to define formulas, how to annotate cells, how to use Group Mode, and it explains what-if conditions. Level II teaches advanced graphing and printing techniques, how to create macros and macro libraries, how to link spreadsheets stored in multiple files, how to use Map View, how to create and sort databases, how to combine records stored in multiple data tables, and how to access multiple tables.

$99 each, from Teachware, P.O. Box 430, Armonk, NY 10504; 800-533-5707.

CIRCLE 12 ON READER SERVICE CARD

## UPGRADES

*Lotus Freelance Plus* 3.01 occupies 438K of conventional memory, 70K less RAM than the previous release occupied. If you restrict the scope of your work, you can cut that requirement to 415K. Two slide-preparation service bureaus, MagiCorp (Elmsford, N.Y.) and Autographix

(Waltham, Mass.), now develop slides directly from files prepared by using *Freelance*. Each provides free registration to *Freelance* users, and prices start at $10 and $12 per slide, respectively (other prices apply for transparencies and color prints). To users of *Freelance* Release 3.01, MagiCorp provides a $100 credit toward the first order. Drivers for all releases of *Freelance* are available from MagiCorp (800-367-6244). Drivers for *Freelance* Release 3/3.01 are available from Autographix (800-548-8558 ext. 1000, in Mass. 617-890-8558 ext. 1000). All drivers are free.

*Freelance Plus* 3.01 now includes drivers for the Epson LQ-2500 and LQ-2550 and the Okidata Microline 393C color printers; HP DeskJet Plus, IBM Personal Pageprinter II, IBM Proprinter X24E/XL/24, and IBM Quietwriter III printers; the HP Colorpro (7440A) plotter; and the Polaroid PallettePlus Computer Image Recorder.

Runs on the IBM PC XT, PS/2, 3270 PC, and compatible computers with 640K of RAM, a hard disk, DOS 2.1 and higher, and a graphics card. $495; $20 to update from *Freelance* Release 3.0; $20 to upgrade from *Freelance* Release 2/2.01 if purchased on or after September 6, 1988; $100 to upgrade from *Freelance* Release 2/2.01 if purchased before September 6, 1988; $150 to upgrade from *Freelance* Release 1.0. From Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 800-872-3387 for upgrade information.

CIRCLE 13 ON READER SERVICE CARD

*MacroLok* 1.02 now lets *Symphony* template developers protect their macros. When the template's user presses the F10 key alone or in combination with the Alt, Shift, or Control keys, *MacroLok* displays the template's main menu instead of granting access to the worksheet. This version lets you turn off the worksheet's borders, includes a sample template from which to begin development of custom applications, and no longer disables the F2 and F5 keys.

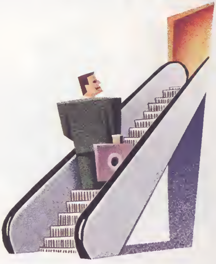
Requires any version of *Symphony*. $99.95, from Custom Management Systems, 11485 South High Mountain Dr., Sandy, UT 84092; 801-572-3303.

CIRCLE 14 ON READER SERVICE CARD

*Financial Needs For Retirement* 2.0 now lets you figure the impact of variable amounts of earned income for each applicable year and the related Social Security losses and tax effects. It is also a help in calculating lump-sum distributions, including IRA, Keogh, SEP (self-employment plan), and other annuity withdrawals. The expanded manual explains what personal data you need in order to use the software.

Requires *1-2-3* Release 2/2.01 or 2.2 and uses 40K of RAM. $50, from V. A. Denslow & Assoc., 4151 Woodland Ave., Western Springs, IL 60558; 312-246-3365.

CIRCLE 15 ON READER SERVICE CARD



*Bottomline-V* Version 3.1 adds the FASB (Financial Accounting Standards Board) Rule 95 to all cash flow models and includes the direct method of cash flow accounting. Using five years of data from balance sheets and income statements, the software lets you produce the following financial statements: changes in financial position, cash flow, and several ratio analyses. The ratio analyses include 23 standard ratios broken into five categories, including company valuations analyzed on the bases of net asset value per share and market price per share. The software also lets you project all statements five years into the future and save those projections for later analysis in *1-2-3*. In addition, the manual now covers graphing.

Requires *1-2-3* Release 1A, 2/2.01, or 2.2. Manufacturer recommends a hard disk. $595; $299 for *Bottomline-V Starter Kit* containing a five-year model, historical model, and 12-month budget and cash flow program. From Ilar Systems, 334 Baywood Dr., Newport Beach, CA 92660; 880-777-4920, in Calif. 714-759-8987.

CIRCLE 16 ON READER SERVICE CARD

## BOOKS

*Using 1-2-3 Release 3*, by Martin Matthews and Carole Boggs Matthews. Divided into sections for the beginning, intermediate, and advanced user. Published June 1989, 619 pages, $22.95 (paperback), from Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; 800-227-0900.

CIRCLE 17 ON READER SERVICE CARD

*1-2-3: From 2 to 3*, by The LeBlond Group. Covers upgrading from Release 2/2.01 to Release 3. Published June 1989, 469 pages, $24.95 (paperback), from Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; 800-227-0900.

CIRCLE 18 ON READER SERVICE CARD

*1-2-3 Release 2.2: The Complete Reference*, by Mary Campbell. Covers every command, feature, and function. Published September 1989, 850 pages, $27.95 (paperback); $19.95 (disk), from Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; 800-227-0900.

CIRCLE 19 ON READER SERVICE CARD

*1-2-3 Release 2.2 Made Easy*, by Mary Campbell. Covers the basics of the program, from spreadsheet organization to file linking. Published September 1989, 600 pages, $19.95 (paperback), from Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; 800-227-0900.

CIRCLE 20 ON READER SERVICE CARD

*Using 1-2-3 Release 2.2*, by The LeBlond Group. Covers upgrading from earlier releases, networking, and using *Allways*. Includes a disk containing an add-in word processor from The LeBlond Group. Published October 1989, 700 pages, $24.95 (paperback and disk), from Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; 800-227-0900.

CIRCLE 21 ON READER SERVICE CARD

*1-2-3 Tips, Tricks, and Traps*, 3rd Edition, by Dick Andersen. Now covers Release 3. Published October 1989, 550 pages, $22.95 (paperback), from Que Corp., 11711 North College Ave., Carmel, IN 46032; 800-428-5331.

CIRCLE 22 ON READER SERVICE CARD

*The Makeover Book: 101 Design Solutions for Desktop Publishing*, edited by Roger C. Parker. Provides before-and-after examples of graphics for newsletters, ads, letterheads, corporate logos, sales brochures, and others. Published May 1989, 278 pages, $17.95 (paperback), from Ventana Press, P.O. Box 2468, Chapel Hill, NC 27515; 919-942-0220.

CIRCLE 23 ON READER SERVICE CARD

*Information for New Products is supplied by the vendors and was up-to-date as of 8/15/89. Since production specifications change frequently, we recommend that you verify this information with a dealer before making a purchase.*

# THE EASY WAY IS THE BEST WAY

BY BOB QUINN

It was sheer laziness that first attracted me to computers. With a computer and some software, I could get things done quickly and easily. Then I found that integrated software let me get things done with even less effort.

Integrated software's roots go back to the days when spreadsheet users wanted to put their spreadsheet tables into the text of a word-processing document. Back then, it seemed that the only way was to retype the spreadsheet into the document. And getting the data into a graphics or database program required the same effort.

The first solution, albeit not a good one, involved using a generic file format that most programs could understand. These "data-interchange" formats, such as ASCII and DIF, did let you move data between programs. But to graph spreadsheet data, you had to exit the spreadsheet and load up the graphics software. And if the data changed, you had to exit the graphics software, reload the spreadsheet, and repeat the whole process. Furthermore, because the file formats were so generic, they could not contain such application-specific information as formulas and display formats.

The next step was graphics software that could read a spreadsheet file format directly. This was an improvement, but you still had to load and unload programs. There was no real connection between the data and the end result.

Then Mitch Kapor and Jonathan Sachs came up with two products that changed the way people worked. These products, *1-2-3* and *Symphony*, made a couple of major strides toward doing things the easy way. First, by combining spreadsheet, graphics, and other functions, they relieved users of the tedium of loading and unloading different software packages in order to exchange or update data between them.

More important, their use of a "single-data model" created a link between the functions so that a graph, for example, automatically reflects any changes in the related spreadsheet. *1-2-3* and *Symphony* don't need to update the graph in a separate operation because both functions use the same data. In other words, you don't need to wonder if the final result is linked to the original data because the final result *is* the original data.

Other software packages in the integrated category, such as *Microsoft Works* and Ashton-Tate's *Framework*, still use the original approach of storing spreadsheet data in one format and word-processing data in another. *Framework*, for example, does make the process of transferring data between modules invisible to the user. However, the software must still carry out the transfer process every time data changes, and the user must still initiate the link.

Operating environments like *Microsoft Windows*, Quarterdeck Office Systems' *Desqview*, and IBM's Presentation Manager also take this approach. These environments have succeeded in creating a communications channel between unrelated applications. But this innovation should not be confused with integration; it is simply improved connectivity for stand-alone applications.

In order to connect unrelated applications, an operating environment must use a lowest-common-denominator approach. That is, it cannot make any assumptions about the type or characteristics of data, since data could be coming from and going to virtually any type of program. In many respects, this is not much different from using data-interchange files.

While the single-data model of *1-2-3* and *Symphony* provides a high level of integration, we can conceive of still higher levels. To achieve them, software must increase its intra- and interconnectivity and make the data-retrieval process invisible. In addition, software developers must unify software functions that are now separated into artificial categories such as "spreadsheet," "database," and "word processing."

Object-oriented programming may provide a step in the right direction. In an object-oriented program, a data "object," like a physical object, can hold multiple properties simultaneously. For example, a bag of a dozen oranges can be considered a single object. However, it has several properties: the shape and color of the whole and of each constituent part, a numeric value of 12, and a textual description of each part and of the whole. These properties correspond, roughly, to graphic, spreadsheet, word-processing, and database aspects.

If one aspect of an object changes, all of its related properties change. That is, if you remove an orange from the bag, the graphic, numeric, and descriptive properties change.

The ultimate software package would be one whose processes are completely invisible. In that respect, the human brain is the best example. Like the brain, an application should be so good at insulating you from all its processes—finding, retrieving, manipulating, and storing data—that you rarely, if ever, become aware of its operations. ■

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*Bob Quinn is Lotus Development Corp.'s* Symphony *product manager*

DAVID SCHUSTER

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CIRCLE 118 ON READER SERVICE CARD

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